



FRIDAY, JULY 21, 1899.

## CONTENTS.

ILLUSTRATIONS:	PAGE	GENERAL NEWS:	PAGE
The Boston Southern Station (with an inset)...	518	Car Building .....	528
Atlantic Type Locomotives for the Erie .....	519	Bridge Building .....	525
Bicycle Racks in the Boston Terminal .....	520	Meeting and Announcements .....	529
Smokeless Firing of Locomotives on the C., N. O. & T. P. ....	51	Personal .....	530
The Heytor Granite Tramway .....	522	Elections and Appointments .....	530
Southern Pacific Terminal at Oakland .....	523	Railroad Construction .....	530
Standard Steel Water Tanks of the Atchison, Topeka & Santa Fe .....	526	General Railroad News .....	531
		Traffic .....	532
CONTRIBUTIONS:		MISCELLANEOUS:	
Early Baldwin Engines .....	517	Technical .....	526
Brake Beams .....	517	The Scrap Heap .....	527
EDITORIALS:		The Delaware Breakwater .....	519
The Ton-Mile Rate and a Great Consolidation .....	525	The New Paris-Bordeaux Express Service, Orleans Railroad .....	520
EDITORIAL NOTES .....	524, 525	Electric Railroads in London .....	520
Trade Catalogues .....	525	The Texas Flood .....	521
GENERAL NEWS:		New Passenger Cars for the Empire State Express .....	522
Locomotive Building .....	527	Statistics of the Railroads of the United States to June 30, 1898 .....	522
		The Outlook for Contracts in the Transvaal .....	522
		Expert Medical Testimony in the Courts .....	523

## Contributions.

## Early Baldwin Engines.

Mount Vernon, N. Y., May 16, 1899.

To the Editor of the Railroad Gazette:

With reference to the engines now being built at the Baldwin Locomotive Works for the Midland and other English railroads, notices of which appeared in your impressions of December 23d, 1898, pages 916 and 920, and March 24th, 1899, page 13, I observe that a recent issue of "Transport" reproduces a paragraph from the English "Railway Magazine" of November, 1839—nearly 60 years ago—as follows:

"We have just seen a sort of prospectus of Messrs. Baldwin, Vail & Hufty of Philadelphia, offering to supply England, Germany, etc., with locomotives of 12½-inch cylinders for £1,046; 12-inch for £1,543, and 10½-inch for £1,337½; an additional sum of 1,710 dollars will purchase duplicate driving wheels, axle and eccentrics, tenders and truck wheels and axles, a set of brasses and 20 copper tubes. If five engines are ordered at once, these gentlemen promise to leave in the hands of the purchaser, for twelve months, £100 for every engine, as a guarantee that the expenses of repairs for the first year, if the engines do not run over 20 miles an hour and over 100 miles per day, shall not exceed 500 dollars. To these promises a long list of testimonials is added. We have before us drawings of these engines, and smutty looking things they are. Their cylinders are placed outside near the front of the engine, and the connecting rod is attached to the driving wheels near the end of the cylinder. We should be sorry to condemn any man's wares untried, but, in our opinion, from the appearance of the machines, Messrs. Baldwin & Co. are either beings of some years past, or have actually mistaken a retrograde for a direct motion in the march of improvement. We should not hesitate to say that one of these engines is not to be compared with one of our best of an equal power in economy of working."

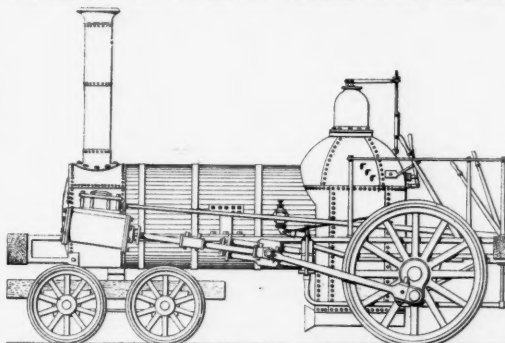
Having a curiosity to see this "Prospectus," I looked up the Baldwin advertisement in the "American Railroad Journal and Mechanics Magazine" for 1839-'40. This advertisement presents small wood cuts of the early Baldwin engines; one of them has outside cylinders and is evidently the "smutty looking" engine criticised by the writer of the above quoted paragraph. The cut is small and poorly executed, so I have made an enlarged copy and send you a tracing herewith, thinking it will be of interest to some of your readers.

As will be seen, the engine differs from the standard Baldwin engine of that day, the cylinders being outside the wheels and the frames made of bar iron. The reversing gear is not fully shown in the drawing and it is necessary to explain that the valve motion was given by a single fixed eccentric for each cylinder. Each eccentric strap had two arms or blades attached to it, one above and the other below, and, as the driving axle was back of the firebox, these arms were prolonged backward under the foot-board with a hook on the inner side of the end of each. The rocking shaft had arms above and below its axis, and the hooks of the two rods of each eccentric were moved by hand levers so as to engage with either arm, thus producing fore or back gear. The engine men called these hand levers "starting bars." From the upper rocker arm the long valve rod extended forward to the steam chest as shown. The guide bar was made hollow and formed the pump barrel, the plunger being attached to the pis-

ton rod by a sleeve keyed thereto. The hollow guide bar terminated in the vertical pump chamber, which was made in two pieces and was held together by a stirrup with a set screw in its arched top.

The first engine of this design, the "Black Hawk," was completed in May, 1835, and delivered to the Philadelphia & Trenton Railroad Co. The cylinders were 10½ inches diameter by 16 inches stroke. Driving wheels 4 ft. 6 in. diameter; weight of engine, 20,000 lbs.

I am informed by an old engine man who remembers seeing these engines, that some of them did good service on the line of the New Jersey Railroad & Transportation Co. They were named "Newark," "Elizabeth," "Rahway" and "Uncle Sam," and, as an offset to the remarks of the captious English critic, I will quote from the report of W. L. A. Sykes, engineer of the railroad above named, under date of June 12th, 1838. Mr. Sykes wrote that he could draw with his engines 20 four-wheeled cars with 26 passengers in each, at a speed of 20 to 25 miles an hour, over grades of 26 feet per mile. "As to simplicity of construction," he adds, "small liability to get out of order, economy of repairs, and ease to the road, I fully believe Mr. Baldwin's engines stand unrivaled. I consider the simplicity of the engine, the arrangement of the working parts and the distribution of the weight far superior to any engine



Baldwin Locomotive of 1839.

I have ever seen, either of American or English manufacture, and I have not the least hesitation in saying that Mr. Baldwin's engine will do the same amount of work with much less repairs, either to the engine or the truck, than any other engine in use."

HERBERT T. WALKER.

Seven locomotives built in America were in use on the Birmingham & Gloucester Railway, now a part of the Midland, in the year 1840; and the (London) Railway News of May 13 prints a copy of a picture made in that year showing one of the engines, the "Philadelphia," drawing eight four-wheel freight cars up a grade of 140 ft. per mile. The scene is near Bromsgrove. These engines were built by Norris, Philadelphia, and the other six were named Washington, Boston, Baltimore, Boston, Niagara and New York. The engine shown in the picture has a single pair of driving wheels and a four-wheel leading truck. The weight of the train shown is 74 tons, and the maximum speed on the grade was 9½ miles an hour.

## Brake-Beams.

Detroit, Mich., July 11.

To the Editor of the Railroad Gazette:

The several articles by Mr. Angier on European practice in brake-beams have been very instructive, but in comparison with the essay by Mr. Dingert, in your issue of July 7, Mr. Angier and all others are completely put in the shade—not to say they have been given a permanent set. I am anxious to hear more from Mr. Dingert on the subject of the deck-beam brake-beam, and as he seems to have some original ideas on the subject, will he not be good enough to tell us how he figures out that the bulb head is to withstand the torsional strains beams are submitted to, and why it is that it has been necessary to thicken the co-called web of the deck-beam until the device now weighs as much as an ordinary wooden beam? If the chief object of a brake-beam is to be not "flimsy" in design, so it "can stand a great deal rough usage," and dead weight isn't an item for the consideration of railroad managements, why not make the beam of a solid, rectangular rolled section? Of course, it would weigh probably twice as much as the deck-beam, but then look how strong it would be, and how much rough usage it could stand.

M. E. NIT.

Chicago Railway Equipment Co.,  
Chicago, July 12, 1899.

To the Editor of the Railroad Gazette:

I have read the several articles in your valued paper referring to brake-beams. While wishing to avoid newspaper discussions, I feel there are some facts which it may be desirable for me to state.

In the first place, in Prof. Hatt's letter (and from which you quote editorially), there is evidently a clerical error where he says: "The range in stiffness under 7,500 lbs. load is from ⅛ in. down to ¼ in. for freight beams," for reference to his table shows two

beams as having tested 0.06 in., which is a little less than ⅛ in.

With reference to the designs of brake-beams shown by Mr. Angier in your June 9 edition, I beg to call your attention to the fact that the types shown in his Fig. 5 and 7 were originally designed and patented by Mr. Stephen Alley, of Glasgow, Scotland, the U. S. patent for which was purchased by this company in 1890. This type of brake-beam was modified and improved by Mr. George Westinghouse, Jr., and he developed what is generally known as the "Westinghouse" beam, the patent for which this company has also owned for years.

The modifications and improvements over the original "Alley" and the original "Westinghouse," as to the end joints (the inserted fillets) and rectangular sections, as shown by Mr. Angier, were developed in this country as early as 1889, as will be seen by reference to the old M. C. B. Standard Drawings in the 1891 Proceedings. This type of brake-beam was thoroughly tested on some of our best railroads and its use practically abandoned (see M. C. B. Proceedings, 1892), not alone on account of the excessive first cost, but because of the much better results obtained from the "composite" type of beam.

Actual practice and accurate knowledge covering years of service and hundreds of thousands of cars, constitutes the best refutation of some of the surmises and criticisms as to the durability of the best form of the composite brake-beam, and as to its ability to meet all the legitimate conditions of service shocks and blows included. To discuss fully why this is true, both from a scientific as well as practical standpoint would take too much of your space. In considering and determining what is the "best design," is or is not, one of the fairest and best tests of the ability of the device to meet not only existing requirements, but advanced and advancing requirements.

About 1894 we were asked, by a prominent railroad, if we could design a brake-beam which would withstand the enormous load of 30,000 lbs. with only ⅛ in. deflection. We were able to at once respond with a brake-beam weighing only 145 lbs. complete (this weight including brake heads, sleeves, strut, etc.) and the working parts of which (or those parts which had to have sections increased to give increased weight and stiffness) only weighing about 76 lbs. The depth of truss was only 16 in. This brake-beam was our standard composite type. We have a number of these beams in special service, and have had for years with conceded success.

Will Mr. Dingert figure out what weight of section it would require to get similar results with his deck or I-beam section? He can probably do this much easier than accurately to state upon what he bases the statement that "the built-up beams are certainly outclassed by the beams made of rolled sections," or make it clear as to just what he means by "out-classed."

Some railroads are certainly not giving the attention to the best foundation brake rigging (particularly brake-beams) which the air brake practice is calling for, and in the immediate future will require. First cost has been, and is still, too often the controlling feature; misrepresentation, partly from ignorance and partly from design, has been a considerable factor. These things will, however, sooner or later adjust themselves.

The "deck" beam is the same beam it was in 1877, and in 1882, and is the same beam that was cast aside by the M. C. B. Committee in 1889 as soon as the 15,000 lbs. load showed a deflection of 0.255 and 0.28 in. None of these beams meet the M. C. B. requirements, nor can they practically be made to do so.

We fully recognize that it is poor economy to buy a "cheap" brake-beam; we also recognize that the present requirements of brake-beams are not high enough, but can you look to deck or I-beams (or even to the so-called solid beams of the Westinghouse type), to meet these higher requirements, when they do not even meet existing requirements? The accepted forms of composite beams are meeting the requirements, and can be made to meet almost any requirement which is likely to develop for many years to come. The best form of brake-beam should have a maximum strength, stiffness and resiliency, with a minimum weight of material; it should have the ability to withstand sudden shocks and blows, torsional strains, and all legitimate service conditions. Such a brake-beam we have, and I speak from the standpoint of over 10 years' constant experience, covering nearly 1,500,000 brake-beams, and the most accurate and careful inspection and reports, as well as personal observation. Is this not more reliable than mere theories?

E. B. LEIGH,  
General Manager.American Brake Beam Company,  
Chicago, July 14.

To the Editor of the Railroad Gazette:

I have noted with considerable interest the different articles in your paper by R. H. Angier, W. K. Hatt and K. Dingert, on solid brake beams, and as I have for some time past been investigating the subject of brake beams in actual service, I am surprised at some of the statements made, and would be pleased to have the gentlemen inform me from



what actual statistics they have made their deductions, as I would also like to make further investigation along these lines.

I note that all of these gentlemen are strongly in favor of the solid type of beam in preference to the trussed form in general use; they are very positive in their statements and leave no room for discussion.

Mr. Angier, who evidently refers to continental practice, says: "obviously a built up beam, designed under the same conditions, will in all but exceptional cases be heavier than a solid one and less secure," notwithstanding the fact that all of our trussed beams weigh from 25 to 30 per cent. less than any of the solid beams in general use and show an increased ultimate strength under test of from 50 to 75 per cent., while even a greater advantage is shown in actual service.

The European form of beam should not be classed with the rolled section, or what is usually known as a solid type of beam, as it is properly a trussed beam, the tension member being welded to the compression member instead of built up in the usual form of trussed beams. This type of beam has been given a fair trial in this country, under what was known as the Westinghouse beam, but did not fully meet all the requirements, and has been largely superseded by the trussed tubular form of beam.

The statement made by Mr. Dingert that "the built up beams are certainly outclassed by the beams made of rolled sections, which is proved by the fact that they are now being rapidly replaced by rolled beams," is evidently a mistake, as I doubt if any railroad mechanical man would exchange any one of the different trussed beams for a rolled section beam. Nobody disputes the fact that many of the roads have made contracts for rolled section beams, but almost without exception it was a case of price and not quality that sold them, as not one of them meets the M. C. B. requirements and in service they develop the same weakness as shown in the tests. A reference to any of the standard textbooks will show that a deck beam of the section ordinarily in use for brake beams is not sufficiently strong for the service required.

In the tests given by Mr. Hatt, I note that the only beams coming up to the M. C. B. requirements were trussed beams, while the T beam or rolled section passed the elastic limit at a point below the load that is applied to a beam under certain conditions. I fail to understand how Prof. Hatt arrives at the conclusion that a solid beam should be preferred in service to a trussed form of beam, after admitting that the results of slow tests in flexure show greater stiffness, strength and resilience per pound of metal in the trussed beams and that these same beams do not usually fail at the joints under these tests. I find in actual service, almost without exception, the same faults that develop under test in the laboratory, lack of stiffness, strength and resilience. His statement that "these beams weak under the flexure test, may give excellent service from the point of view of the storekeeper or purchasing agent, although when considered as part of the whole brake system they may be objectionable," is well taken. If some of our railroad officials would ask the opinion of some of the car inspectors regarding some of the solid section beams in use, they might change their own opinion very materially as to either the efficiency or economy of using them.

H. M. PERRY.

#### The Boston Southern Station.\*

By J. P. Coleman.

[WITH AN INSET.]

#### ELECTRO PNEUMATIC INTERLOCKING—METHOD OF TRANSMITTING POWER.

There prevails to some extent to-day an erroneous impression that the operation of switches and signals by air at high pressure is attended with more danger of false operation than when they are operated by low pressures, and that high pressures are symbolic of high expenses.

As to the latter: it is as true with compressed air as with steam, electric and hydraulic pressures, that high pressures (per unit of power developed) are cheaper than low pressures both as to their cost of production and of transmission, while their application to the performance of work is made through mediums cheaper of construction and maintenance by reason of the smaller pipe, piston, and valve areas required, and for the reason that smaller foundations and less space generally are required by these appliances than by those performing a like amount of work with air at lower pressures. As to the mechanical effects of high pressures upon the switch or signal operated, in comparison with the mechanical effects produced by low pressures adapted to the same work, explanation beyond the statement that the effects are equal should be unnecessary; but as a fundamental law of physics seems to be overlooked by many in considering this subject, a few remarks in explanation may not prove amiss.

Entire villages have been destroyed during tornadoes by the action of air at a pressure of less than

8 oz. per square inch, evidently not because the pressure was high (in the usual sense of the word), but because the area upon which it acted was large. A building presenting a front area of 1,000 square feet to a storm that exerts against it a pressure of 0.1 lb. per square inch, is under a stress of 14,000 lbs. that is tending to shift it. The same building having an end area of 200 square feet would be no more endangered by a storm developing a pressure of .5 lb. per square inch upon its end than it would be by the milder storm acting against its side. What is true of the effects of atmospheric pressures naturally developed, also applies to pressures artificially generated. Air compressed to 15 lbs. per square inch will produce upon a piston of 100 square inches area just as much mechanical effect as will air at 75 lbs. per square

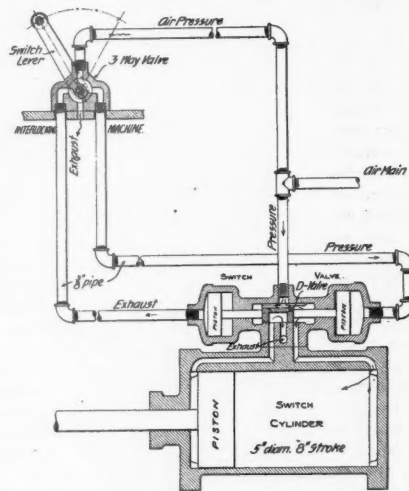


Fig. 1.—Pneumatic Switch Movement.

inch upon a piston of 20 square inches area. It is apparent, therefore, that in mechanical effect upon the switch or signal operated, high pressures are no more disastrous or dangerous than are low pressures, when the cylinders are equally well proportioned to the work to be performed by them. By reason of the small areas and parts in general, that are possible in high pressure appliances, these are easily kept free from leaks and from excessive friction, they are compact and readily repaired, inspected and renewed, and in switch operation lie entirely below rail level, while still permitting their support by the ties of the switch.

Pneumatic interlocking is decidedly advantageous over other methods only where much traffic and track complication exists, as at terminal stations chiefly. At such places compressed air at high pressure is advantageous in charging air-brake tanks and testing brakes, cleaning car upholstery, operating turntables, elevators, draw bridges, fire pumps, and for many other purposes to which air at low pressure is either inconvenient or wholly unsuited. A greater reserve energy may be stored in the air main and reservoirs of an interlocking plant at high pressure than in the same appliances at low pressure, and a longer stoppage of the compressor for inspection and repairs may be made in consequence without inconvenience to the system. Condensation problems are so readily solved as to have, in late years, become a source of no inconvenience to the successful use of air at any desired pressure. Expansion of air at high pressure from an exhaust continuously maintained, as from a pneumatic engine, is liable to cause freezing of the exhaust ports in very cold weather; but the infrequency with which switch cylinder exhausts occur under the heaviest of interlocking service renders these appliances entirely free from such likelihood.

These preliminary remarks are offered that a few of the reasons for maintaining high pressures in the system about to be described may be properly considered, and that the custom may be compared with the best practices in other branches of fluid pressure engineering for its support, if the wisdom of it is not already apparent.

Another feature of this system concerning which wrong impressions are prevalent, deserves some explanation here, i. e., the extent to which electricity is employed, the reasons for its use, and the amount and cost of the current employed.

Eighteen years ago, when the electro-pneumatic system was in its early experimental stages, the then very general distrust of electricity outside of the telegraph and telephone fields, and the want of reliable generators for producing it economically in the quantity demanded by the system as then designed, discouraged an attempt to operate switches in the manner employed by it to-day, and it, as first introduced to service, employed electricity, therefore, only as a means of insuring the switch and its operating lever coinciding in position.

The switches were operated by the motion of a three-way pneumatic valve attached to the lever of the interlocking machine; this valve (Fig. 1) when operated, admitted pressure to one or the other of two small pipes extending from it to an auxiliary

valve attached to the switch cylinder; this auxiliary valve in turn controlled the admission and discharge of air directly to and from the switch cylinder. Each operation of a switch thus consumed a volume of air equal to the cubical contents of the switch cylinder, and of one of the pipes leading therefrom to the interlocking machine. These pipes were of necessity often times of great lengths; and to make them reasonably free from choking due to sediment and from frost within them, they were never less than  $\frac{3}{4}$  in. diameter. The loss of the air contained in one of these pipes at each operation was not so serious as was the loss of the time required by its discharge and that of the air within the cylinder, by this method of operation. With a view to eliminating both losses, liquid was employed in the pipes, which, being non-compressible, insured a reasonably rapid response of the switch valves to their lever movements.

This liquid in early applications consisted of dilute alcohol, but in later ones a solution of calcium chloride was substituted as a much cheaper non-freezing fluid. Although moderately successful this method proved annoying from mixture of the air and liquid gradually causing loss of the latter during exhausts, and it was also somewhat expensive to maintain, while the multitude of pipes, valves and fittings it necessitated, both within and without the tower, was a source of more or less complaint.

In 1892, experiments had been completed which led to the substitution of electric wires for the hydraulic pipes formerly used for operating the switches; electro-magnets were substituted for the small hydraulic pistons that were formerly used to shift the auxiliary valves attached to the switch cylinders, and the air valves attached to the switch levers of the machine were at the same time abandoned and circuit controllers substituted, to suit the requirements of the new controlling element. (This is illustrated by Fig. 2).

In pursuance of the principle adopted at the beginning, that the force which operates a switch should be maintained in action against it when the latter is at rest, in order to avoid the possibility of faulty operation resulting from leaks and sediment in cylinders, valves and pipes, the electric current as well as the compressed air is retained in action upon the switch cylinder and its controlling valves at all times, and whether in their normal or reversed positions. This operation of switch valves electrically is commended chiefly on account of the total freedom it insures against the admission and discharge of air to and from them through long pipes or other passages of comparatively small areas. The reliability of any power system employing compressed air is affected largely by the freedom of its exhausts, and

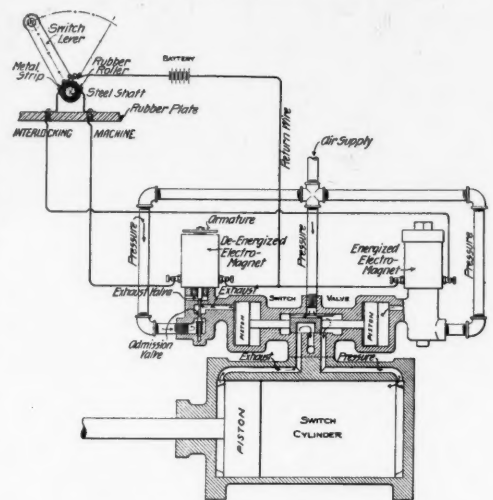


Fig. 2.—Electric Switch Movement.

no more exacting requirements are made of any system in this respect than those of pneumatic interlocking plants.

The electric wires between switches and the interlocking machine form a cheaper and more readily repaired medium of operation than were the pipes formerly used, with their multitude of fittings and their greater liability to trouble, and susceptibility to deterioration. This medium, too, insures an instantaneous response of switch valves to lever movements; it eliminates entirely the somewhat dangerous effects formerly experienced from the admission of air to one valve pipe before totally discharging it from the other, during operations under certain abnormal conditions of the system, since the electric current is never present at the same instant in conductors having opposing functions. This is true however quickly the lever, or the switch, may be operated, and whether the switch responds fully, partially, or not at all to the lever movements.

The danger of operating switches from their levers exclusively by fluid pressure lies primarily in that portion of the system which is designed to insure switches and their operating levers coinciding in position, and which is familiarly termed the "switch indications." This danger is due to the momentary

\* Continuation of an article published in the Railroad Gazette, May 12. The article was accompanied by an inset containing a diagram of the Terminal Yard and a bird's eye view of the same.



action of the pressure in two pipes of opposing functions during switch operations.

It was the greater likelihood of "false" indications occurring when these were controlled by air pressure in long pipes susceptible to simultaneous pressures during operation, and to faulty discharges from sediment accumulating within them, and it was also the dangers of pistons or diaphragms failing to properly engage the levers after each movement from these causes as well as from neglect to maintain the operating devices in proper repair, that led to the adoption from the beginning of electricity and electric devices for this important duty.

It may be stated that while economy of construction, economy of both power and time in operation, and economy of labor and material in maintenance, are all incidental advantages to the use of electricity, as against fluid pressure in controlling switch indications, the chief and all important advantage of the former method is the safer and simpler means it presents for performing this most important work.

What has been said of the advantages of operating switch valves electrically, applies with equal force to the method of operating signal valves electrically; and the inestimable advantage of so operating the valves of pneumatic signals, when the latter are applied to the service of automatic block work, seems too apparent to warrant recital of them, since the possibilities of thus controlling block signals through distances and by means wholly beyond the scope of air pressure alone, is clearly evident.

The extensive use of pneumatic interlocking, and of pneumatic block signaling, and the interdependence of the two, is well illustrated by recent installations, a marked example being the New York Division of the Pennsylvania, where the 90 miles of four tracks, between Jersey City and Philadelphia, will soon be fully equipped with the pneumatic block system. Many of these signals also perform the functions of protecting the numerous interlockings along that line. For many years the Harlem Di-

vision potentials is avoided, and the wasted energy consumed in battery and line resistances is proportionately lessened also. The increase of battery potential necessary to meet this increase in magnet resistance is relatively small, and the current discharge from the battery is, consequently, much less than that discharge from the lesser number of cells formerly employed through magnets of lower resistances doing an equal amount of work.

So far has this feature been carried lately in the electro-pneumatic system, and so great has been the improvement in magnet and valve construction, that signal and switch valve magnets, which a few years ago were wound to 16 ohms, and required for their operation a potential of 4 volts at their terminals, are to-day wound to 130 ohms, and yet operate equally well under the same battery potential—4 volts.

At the new station in Boston, where 78 switch valve circuits are normally closed upon the battery, and where 28 additional indicator circuits, and 48 signal circuits may at the same time be closed, the maximum discharge from the batteries will not exceed 5 amperes of current, while the normal discharge will be under 4 amperes. The electrical energy consumed here under maximum service is less than 60 watts. This could be readily drawn from a set of any good type of primary battery that has low internal resistance, but the frequency with which renewals of such batteries would be required, makes the use of storage cells desirable for this service, and the abundance of electrical energy available for charging these cells at this station makes their use extremely economical.

These cells are charged by a rotary transformer within the interlocking tower, driven from the electric light mains. There are two sets of batteries employed, that ample reserve supply of current may be had in the event of injury to the generator or to the lighting mains supplying it with current.

As explained in the previous article, the shed

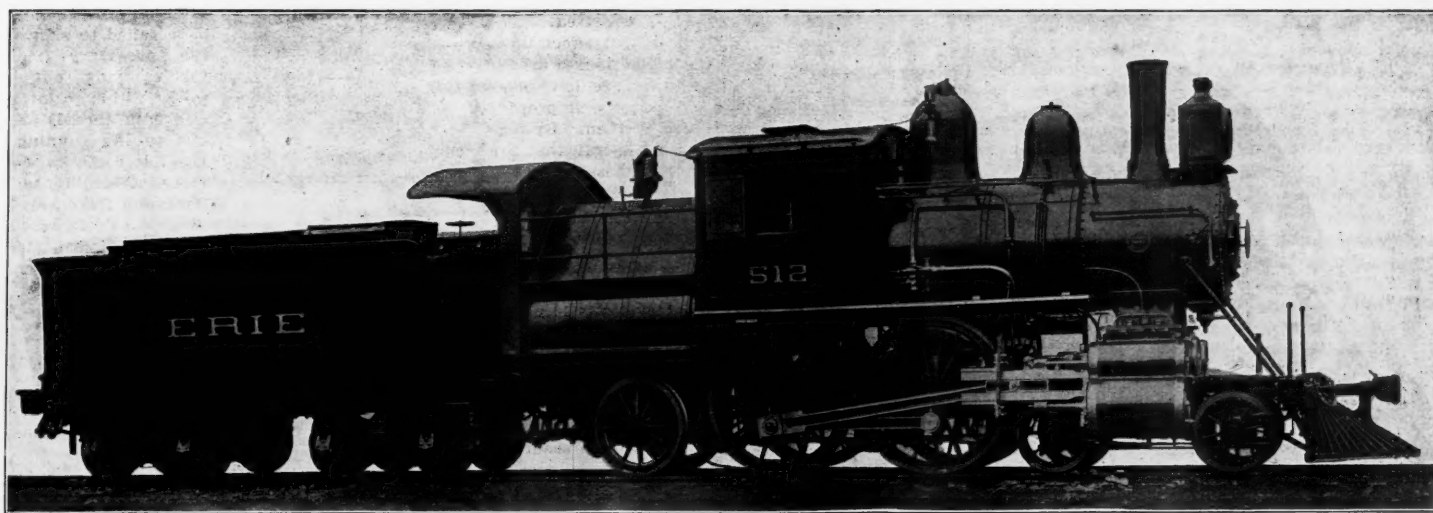
graving from a photograph and to give the following particulars about the engines.

These compounds have a total weight of 151,000 lbs., with a stroke of 26 in. and 13 and 22 in. cylinders. The drivers are 76 in. in diam. and the working steam pressure 200 lbs. Some of these have been running for a few weeks, and the remainder are to be delivered by September. Other particulars are as follows:

Weight on drivers.....	84,290 lbs.
" " trailing wheels.....	30,175 lbs.
" " engine truck.....	36,545 lbs.
Diameter of cylinders.....	13 and 22 ins.
Stroke of pistons.....	26 ins.
Diameter of drivers.....	76 ins.
Type of boiler.....	Wooten
Working steam pressure.....	200 lbs.
Tubes, number.....	271
" material.....	Iron
" outside diameter.....	2 ins.
" length.....	15 ft. 0 in.
Firebox, length.....	96 ins.
" width.....	96 ins.
" material.....	Carbon steel
Tank capacity for water.....	5,000 gals.
Coal capacity.....	8 tons
Special Equipment	
Air brakes.....	Westinghouse
Axles.....	Steel
Bell ringer.....	Gollmer
Brake beams.....	Kewanee
Brake shoes.....	Ross
Couplers.....	Gould
Headlights.....	Rochester
Injector.....	Metropolitan & Monitor
Piston rod packings.....	U. S.
Valve.....	U. S.
Safety valve.....	Consolidated
Sanding devices.....	Leach
Sight-feed lubricators.....	Detroit
Springs.....	French
Steam gages.....	Ashcroft
Steam heating equipment.....	Gold
Tires, driving wheel.....	Standard
" truck wheel.....	Paige
" tender wheel.....	Paige

#### The Delaware Breakwater.

Lieut.-Col. Charles V. Raymond, Corps of Engineers, U. S. A., Engineer in charge of the Delaware Bay Harbor Improvements, has submitted his final report on the Delaware Breakwater at Lewes, Del.,



New Atlantic Type Locomotive for the Erie Railroad.

vision of the New York Central, and other lines, have been similarly protected. The use of one type of apparatus for interlocking service, and another type for block service, would be unwise, and, under modern practices, where the two are frequently combined, would lead to useless complications and to more or less inconsistencies. Early recognition of these facts, and a faith in the possibilities of electricity as an agent for controlling reliably, and in a simple manner, the admission and discharge of air to and from signal operating cylinders, has resulted in the gradual improvement of the electro-pneumatic signal, until it to-day stands unrivalled by any device of like importance in simplicity and reliability.

Until quite recently the custom in all branches of electric signaling was to employ magnets of low resistances, and batteries of as low e. m. f. as the work to be accomplished would permit. This practice was not without economical advantages where gravity batteries were used, where line resistances were low, where work to be performed was light, where the batteries were convenient for inspection and renewal, and where it was not advantageous to operate simultaneously many circuits in multiple from one set of batteries. But the rapid development of electric block signaling, of electric locking, of automatic highway crossing bells, of automatic train announcements, and the extensive introduction of electric signal repeaters, call bells, indicators, and kindred appliances in recent years have so altered conditions that great economical advantages are to be derived by the use of high resistances in the magnets of these appliances. This is especially marked where their external circuits are of high resistance, and where there are many to be operated in multiple from one source of electric supply, and particularly when the generator consists of gravity or other forms of batteries with high internal resistances, since serious fluctuations in bat-

tracks of the new station are equipped with rail circuits which control cautionary signals governing the approach of trains to the station, and which also control indicators within the tower by action of trains within the shed. Indicators and bells for other purposes also employ the energy of the storage cells within the tower.

It is a peculiar fact that the 28 rail circuits, alone, require for their operation a greater amount of current from these cells than do all of the combined appliances that form parts of the interlocking system proper, yet this energy when all tracks are short-circuited by trains within the shed represents but 30 watts.

It will be seen from this, that the current used for the electro-pneumatic devices even at this—the largest single interlocking plant in the world—is a small item of expense, and represents an almost insignificant consumption of energy, and that batteries of practically equal capacity to those now employed would still be required for the electrical work to be performed outside of the shifting of switch and signal valves, were fluid pressure used exclusively for this latter purpose.

In a later issue, a description of the electro-pneumatic system, as now practically completed at the Boston Southern Station, will appear.

The diagram of switches and signals, and the general views accompanying this article will be supplemented by more detailed ones in the next.

#### Atlantic Type Locomotives for the Erie.

Fourteen Atlantic type locomotives have recently been ordered from the Baldwin Locomotive Works by the Erie Railroad. Through the courtesy of Mr. A. E. Mitchell, Superintendent of Motive Power of the road, we are enabled to show the accompanying en-

to the Chief of Engineers at Washington. The report covers, in the main, the work done from 1884 and contains outlines of various projects suggested and those finally adopted, together with data, which will be of great use in future work of this kind.

The original Delaware breakwater harbor was formed by two detached breakwaters separated by a space of 1,350 ft. This part of the work was begun in 1828 and completed in 1869. The work just completed consisted of building a breakwater between the parts formerly completed, and work on this new portion was actively begun in 1884. The total amount spent on this work was about \$855,000.

Up to 1890, 101,713 tons of stone had been deposited, and in 1891 the structure had been raised to low water over a distance of 603 ft. This part of the work was exposed to violent storms. Up to June 1, 1892, the structure had been raised to low water over a distance of 1,006 ft., 34,022 tons of stone having been deposited. Since then the work has progressed rapidly, the largest amount in any one year being done in 1898, when 26,927 tons were deposited. The work was completed on June 30 of last year.

The fundamental principle adopted in the new project for the completion of the substructure, plans for which were adopted in 1891, was to deposit all the materials within the assumed limits of the low water width and permit the mass to assume its slopes under the action of the sea. The larger stones were to be deposited on the sea side and the smaller stones on the harbor side of the work. The slopes assumed for the purpose of estimating quantities were adopted from the cross-section of the old breakwater. The inner and outer walls of the superstructure were to be formed with very heavy stones laid endwise to the sea, the interior space to be compactly filled with rubble. Referring to this point, the report says:

"The characteristic advantages of random stone



breakwaters, as compared with breakwaters of other types, are the facility and simplicity of their construction and repair. Their peculiar disadvantage is that they require a large volume of material in the substructure, most of which is not needed to resist the action of the sea and serves only to support the comparatively small resisting parts of the work. Accordingly, it is desirable to confine the volume of the substructure to the smallest limits consistent with permanency and stability, and the project was prepared with this end in view."

In planning the project the following assumptions were made: The height was assumed at 14 ft. above mean low water, or 9½ ft. above high water. The slopes were assumed at about 1 on 7. This slope is much steeper than has usually been adopted on the sea side of the breakwater. The harbor slope was assumed at 1 on 1.3. The lower sea slope of the substructure (i. e., the slope below the plane of rest) was assumed at 1 on 1.5, which is the same as in the old eastern breakwater.

The upper sea slope of substructure (i. e., the slope between the plane of rest and the foot of the superstructure) was assumed at 1 on 3.

Each cubic yard of enrockment was estimated as requiring 2,798 lbs. of stone. The height of the superstructure is 9.5 ft. above high water. Only in time of severe storms does any water pass entirely over the work. The report states that it does not seem desirable to build the superstructure so high that it will be compelled to absorb the accumulated energy of the entire wave, the theoretical objection to the steep exterior slope being that it intensifies the action of the returning wave and thus causes a displacement of the material of the substructure just below low water at the foot of the outer wall.

#### The New Paris-Bordeaux Express Services, Orleans Railroad.

By J. P. P.

The Orleans Railroad of France, although of recent years somewhat outpaced by the Nord, has always held a very honorable position in the history of French express train speeds, and its latest sensational accelerations will enhance its reputation. The table below does not, owing to space considerations, chronicle all the improvements put in force on the 1st of July, but gives the most notable of them, and, for purposes of comparison, the old schedules of the trains on the outward journey are given side by side with the new times. These latter are very remarkable, and, for the Sud-Express, are unequalled either on the Continent of Europe or in England. Les Aubrais to St. Pierre des Corps, 71¼ miles in 72 minutes; St. Pierre to Poitiers, 61¼ in 68 (outward) and 67 (return), and Poitiers to Angoulême, 70¼ in 74, are the most brilliant sections. The tables are compiled from official sources:

Paris to Bordeaux, July, 1899.

Distances (official), Kilometres.	Distance, English Miles.	Stations.	First-Class Rapide.		Sud Express (Wagon-Lits).	
			Old Schedule.	New Schedule.	Old Schedule.	New Schedule.
			a. m.	a. m.	p. m.	p. m.
118.928	74¼	Paris. dep.	9 35	10 03	8 14	8 23
		Les Aubrais, (for Orleans) arr.	11 07	11 28	10 03	9 43
		dep.	11 13	11 31	10 08	9 47
113.909	71¼	St. Pierre des Corps, arr. (for Tours) dep.	p. m. 12 36	p. m. 12 47	11 28	10 59
		dep.	12 42	12 52	11 34	11 04
103.611	64¼	Poitiers, arr.	2 02	2 04	a. m. 12 33	a. m. 12 12
112.817	70¼	Angoulême, dep.	2 08	2 19	12 58	12 16
		arr.	3 36	3 27	2 23	1 30
		dep.	3 41	3 32	2 28	1 34
		Tours, arr.	4 46			
		dep.	4 47			
		Bordeaux (Bastide), arr.	5 29			
134.341	84	Bordeaux (St. Jean), arr.	5 39	5 08	4 14	3 05
583.566	364¼		Minutes 460 (net)	Minutes 407 (net)	Minutes 459 (net)	Minutes 385 (net)

No opportunity has yet been afforded the writer of testing the work of these fine trains in actual practice, but particulars of the gradients over which the work is accomplished have been supplied by the Orleans Company and are herewith:

(a) Paris to Les Aubrais—Almost level to Athis-Mons (10 miles), ascends about 1 in 300 to Marolles (22¼ miles), level almost to Etampes (35 miles), ascends at 1 in 125 for 5 miles, thence almost level to Les Aubrais.

(b) Les Aubrais to St. Pierre des Corps—Almost imperceptible descent to Blois (37 miles) from Les Aubrais, drops 1 in 200 and 1 in 300 for 6 miles, then again easy descent to St. Pierre des Corps.

(c) St. Pierre des Corps to Poitiers—Ascends 1 in 200 for about 4 miles, drops about 2 miles at same rate, ascends about 7 miles at 1 in 200 and 1 in 250, descends about same distance on 1 in 200 and 1 in 180, and then rises almost imperceptibly all the way to Poitiers.

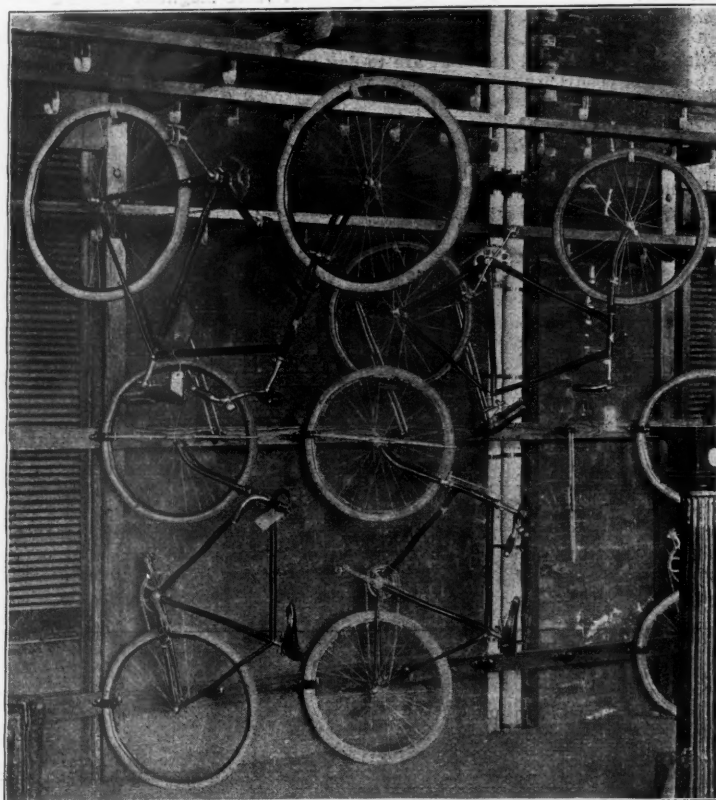
(d) Poitiers to Angoulême—Rises gradually 12 miles to Vivonne, then for 14 miles ascends at 1 in 330 and (chiefly) at 1 in 200. Thence for 26 miles (to Luxé) descends, with minor short ascending stretches, chiefly at 1 in 200. Then an ascent of 5 miles at 1 in

200 and 1 in 250, and a drop into Angoulême, chiefly at 1 in 330.

(e) Angoulême to Bordeaux—Ascends 15 miles (past Charmant) at 1 in 200 chiefly, descends on same grade (often easier) to La Roche-Chalais (40 miles from Angoulême), rest easy descent.

#### Bicycle Racks in the Boston Terminal Station.

In our issue of April 7, 1899, we described the application of bicycle holders to baggage cars of the Long Island Railroad. We now show a bit of the new Ter-



Bicycle Racks in the New Boston Terminal Station.

minial Station in Boston, Mass., which has lately been fitted with similar racks for taking care of bicycles. The charge for storing bicycles is 10 cents a day, when the bicycle is not checked to or from the station; on checked bicycles there is no storage charge for the first 24 hours, but after the expiration

will be very expensive, for it must be made strong enough to bear the Great Western trains, and it has to be constructed in such a way as not to impede the traffic of the Great Northern. From King's Cross to Holborn the line must pass beneath private property at great depth. At Holborn it will cross the Central London electric and proceed thence to the Strand terminus. The total length will be 6 miles, 2 furlongs and 7 chains, and the cost in the neighborhood of twelve million dollars. The Great Northern finds itself quite unable to adequately deal with the enormous suburban traffic, hence this new scheme, which will render considerable assistance in coping with it.

The other bill, the Baker Street & Waterloo, is for an extension of an already authorized line, from Baker Street to Paddington and St. Pancras. The bill asks for power to raise about \$9,000,000, and this includes various subways for establishing connections between the stations of other railroads.

In the course of the evidence given in regard to this scheme, statements were made by Sir Benjamin Baker, Sir J. Wolfe Barry and Mr. W. H. Preece, C. E., which doubtless possess considerable interest for New York. The heavy cost of these lines handicaps them when they come to the investing public for capital. More than once the public have failed to subscribe the necessary money for carrying out the works, although interest was guaranteed previous to the running of the line. As to costs, these, according to Sir Benjamin Baker, are estimated as follows. The Central London, \$2,925,-

000 per mile; Baker St. & Waterloo, \$2,875,000 per mile; Great Northern & City, \$3,260,000; North West London (another scheme recently brought before Parliament), \$2,425,000 per mile; Great Northern & Strand, \$2,510,000 per mile. These figures include stations, subways, electric lights, professional charges and working capital.

Bordeaux to Paris, July, 1899.

Distances (official), Kilometres.	Distance, English Miles.	Stations.	First-Class Rapide.	Sud Express (Wagon-Lits).	
				Lisbon.	Madrid.
			a. m.	a. m.	p. m.
		Bordeaux (St. Jean), dep.	10 16	2 05	12 1
		Bordeaux (Bastide), dep.	10 37		
134.341	84	Angoulême, arr.	12 09	3 36	1 43
247.158	70¼	Poitiers, dep.	12 14	3 41	1 48
350.769	64¼	St. Pierre des Corps, arr.	1 33	4 56	3 12
464.738	71¼	Les Aubrais, dep.	1 38	5 01	3 16
583.666	74¼	Paris, arr.	2 49	6 08	4 32
			2 54	6 13	4 36
			4 11	7 30	5 56
			4 14	7 35	6 00
			5 36	8 57	7 26
582.316 (Bastide)			Minutes 401 (net from Bastide)	392 (net)	428 (net)
583.666 (St. Jean)	364¼				

Note—Trains stop outside the Orleans station at Paris for the "contrôle des billets" 1 minute before times of arrival in Paris, as shown above.

#### Electric Railroads for London.

Parliamentary committees have during the past few weeks considered in exhaustive detail the Great Northern & Strand, and the Baker Street & Waterloo extension bills. The former proposal is for an electric line from Wood Green to the Strand. It will consist of four separate railroads. The first will be from Wood Green to Finsbury Park, and will be 1 mile, 3 furlongs and 9.5 chains in length. Number two will be from Finsbury Park to King's Cross and the whole of that section will be practically beneath the present line of the Great Northern, with whom the new company are really affiliated. The tunnel

Sir J. Wolfe Barry and Mr. W. H. Preece gave evidence against the scheme on behalf of the Metropolitan Railway, and District Railway, who opposed the extensions because they would result in the establishment of a direct competitive service. The Metropolitan experiments with electric traction were referred to at length. As has been already stated in the *Railroad Gazette*, these two gentlemen are supervising the experiments which were described as the first real practical trials of electrical traction for full-sized stock that had ever been made in England. The engine and dynamos are now being erected near Earl's Court, and conductors are being laid on the rails to Kensington Station, and in a few months a train will be running. The object, as explained by Sir J. W. Barry, is not to convince Mr. Preece or himself of the practicability of working the Metropolitan service electrically, but before so large a change is made they had determined to thoroughly satisfy themselves that they had got the best kind of rolling stock and the best kind of conductors, and that they should gradually habituate the employees and staff to the electrical mode of traction. With electrical traction it is declared that about a third more than the present number of trains will be ac-



commodated. Mr. Preece's evidence was to the effect that electrical working would free the tunnels from foul air, and the increase of temperature in the tunnels of 10° or 12° would be done away with. The present mean rate of traveling on the inner circle of 11.2 miles an hour will be increased to at least 14 miles. The present time occupied by the journey round the whole inner circle will be reduced from 70 to less than 50 minutes, and in that way eight new trains may be brought into service.

The London County Council this year assumed possession and control of over 70 miles of street tramways, and is now seriously engaged considering what method of electrical working shall be adopted, in order that a cheaper, more rapid, extensive and convenient service of passenger traffic may be introduced in the suburbs of London. Professor A. B. W. Kennedy was recently commissioned by the London County Council to investigate completely the various systems used for such busy towns as London, both in America and on the Continent. After several weeks' tour, inspecting the principal electrical systems in the States and at Brussels, etc., he has returned to prepare his report. This is being awaited with great interest. Meanwhile the London County Council has been trying to get a bill through Parliament for the equipment of lines on the electric trolley, conduit or surface contact methods, and proposing to dispense with the sanction of the various local authorities through whose districts the new lines would run. But the scheme did not succeed. While Prof. Kennedy's report is being awaited, however, a member of the Council, Mr. Baker, who last year also made an extensive tour of inspecting the electric traction systems of the States, comes forward with a proposal which affects the very heart of the city of London. It amounts to this: That the Council investigate the practicability of constructing "a shallow underground electric tramway" from Westminster (via Parliament Street, Strand, Fleet Street and Cheapside) to the Bank, on a similar principle to those laid under Andrássy Strasse, Buda Pesth, and in Boston, U. S. A. This proposal will hardly receive serious consideration at the hands of the Council.

The electric trolley lines of the London United Tramways Company are being pushed forward with all speed and it is expected that by about August one section will be running. At present there is no trolley line in existence nearer to London than Dover, hence the remarkable ignorance displayed by the great majority of Londoners when they talk about the trolley, which they have never seen.

A. H. B.

#### Smokeless Firing on the C. N. O. & T. P.

Mr. W. J. Murphy, Superintendent of the Cincinnati division of the Cincinnati, New Orleans & Texas Pacific, sends us the accompanying half-tone pictures showing two of his passenger engines which are working hard, yet are throwing no smoke. For some time the officers of that road have been diligently at work improving the work of their locomotive firemen, and the progress made is highly gratifying. Mr. Murphy writes:

"There is no detail in connection with the operation of this line (outside of the necessary precautions for safety) to which the management gives so much special and continued attention as the prevention of the emission of black smoke by locomotives on passenger trains, which is the cause of so much discomfort to passengers. The accompanying illustrations show examples of what has been accomplished. Fig. 1 represents the 'Queen & Crescent Limited,' with five cars, running up a 52 ft. grade at a speed of 61 miles an hour; and Fig. 2, the same train with eight cars running up a 26 ft. grade at a speed of 40 miles an hour, as indicated by the speed recorders on the engines. It will be noted that the objectionable black smoke is conspicuous by its absence.

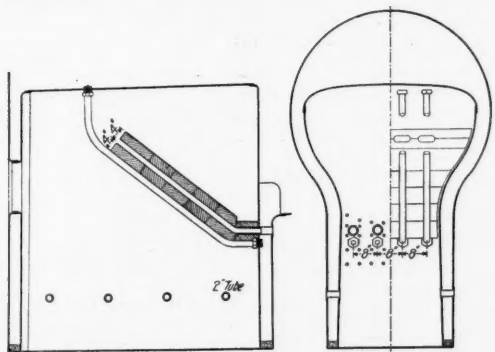


Fig. 3.—Fire-brick Arch Used in C. N. O. & T. P. Passenger Locomotives

"To secure these results, it was necessary, first, to equip the engines with brick arches, the design of which is shown in Fig. 3. Four holes are made in each side of the firebox for the purpose of admitting air, and four tubes run through the arch. The outside air, passing through these tubes, is heated to a high temperature. This heated air supplies oxygen to the unconsumed gases and produces complete

combustion. The four holes in the side of the firebox are located 12 in. above the grates and into these openings are inserted the Sharp patent deflecting air tubes, deflecting the air to the fire.

"The second essential is the thorough education of the enginemen and firemen in the methods necessary to produce the desired results. To this end carefully prepared instructions were issued (see below). Screened lump coal of good quality is used. Whatever the quality of the coal, the training of the men must be sound. In addition to the training, the most persistent vigilance on the part of the officers was necessary to secure continuous good results, for it developed in this case, as it often does in others, that the new plan became, in time, an old story. Some of the men grew careless and dropped back to the good old-fashioned way of firing, half a dozen shovels of coal without intermission. For the purpose of keeping a close check on all passenger engines, small report blanks were furnished to all officers of the road (General Passenger and General Freight Agents, Road Master, Track Supervisors, Signalmen, etc.), and it is their duty when they observe smoke on passenger trains to report the matter by filling out the blank and forwarding it to the Superintendent, who promptly investigates, taking such action as will correct the matter. If it be poor coal, as has developed in most instances, a better quality is supplied; if it be careless firing, the person responsible is disciplined."

#### INSTRUCTIONS FOR FIRING PASSENGER LOCOMOTIVES.

##### Explanatory.

Bituminous coal contains a large percentage of hydrocarbons, which are nearly all driven off as gas by the heat of the furnace, in a few seconds after the coal enters the firebox. Hydrocarbons, when unconsumed, make objectionable black smoke, but when a sufficient quantity of air is mixed with the hydrocarbons combustion is complete and no smoke appears. Passenger locomotives have been provided with hollow fire brick arches and



Fig. 2.—Forty Miles an Hour up a 26 Ft. Grade.

deflecting air tubes to deflect the gases and to supply the necessary air to make perfect combustion.

##### Rules.

After firing each shovelful of coal the door must be left open one or two inches for a few seconds, admitting enough air to produce complete combustion of the gases driven off from the coal. Care must be taken not to leave the door open longer than necessary to consume the gases.

Firemen must learn to work with as light a fire as possible. Great care must be taken that steam is not wasted at the safety valve, either when the train is in motion or when standing still.

Before starting the blower must be put on and a sufficient supply of coal put into the firebox to insure a good, solid fire. After the coal has been put in the door must be left partly open by placing the latch on the first notch of the catch, to so remain until the smoke entirely disappears, when the door must be closed.

After starting, the door must be left partly open after each shovelful of coal is put into the firebox, by placing the latch on the first notch of the catch until such time as the smoke disappears, when the door must be closed.

On approaching tunnels the fire must be replenished in ample time, obtaining sufficient fire to carry the train through the tunnel without smoke, the door to be kept closed while passing through tunnels.

The engineman should so arrange the water supply that the fireman may be able to fire the engine regularly and economically, and this can be done best when the water is supplied to the boiler continuously.

Firemen must pay particular attention to the manner in which the engineman works the injector and handles the engine, in order to regulate the fire accordingly.

Care must be taken to have the blower applied and the door partly open when approaching a station where a

stop is to be made, and no smoke must be allowed to show from the stack at such times or when descending grades.

While the blower is being used, except when approaching a station where a stop is to be made, care should be taken to keep the door closed as much as possible, more especially when cleaning the fire, as the blower causes the cold air to be drawn into the flues.

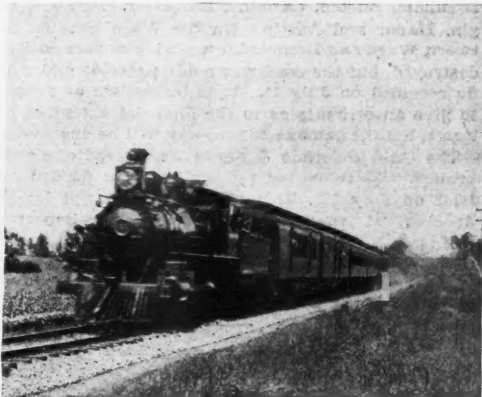


Fig. 1.—Sixty-one Miles an Hour up a 52 Ft. Grade.

While lying on side tracks, both dampers should be closed, to save the fire.

Grates should be shaken only when absolutely necessary, as too frequent shaking causes a loss of fuel by allowing the unconsumed coal to fall into the ash-pan, where it ignites and causes the pan to heat and warp. Ash-pans should be examined as frequently as stops will permit, and under no circumstances must they be allowed to become filled.

When possible to avoid it, the fire door must not be left wide open. To leave the fire door wide open is especially bad when using steam or blower.

It is beneficial to wet the coal before firing, and firemen should, as far as possible, use wet coal.

Intelligent firing and economical results in the use of fuel will be considered in the selection of firemen for passenger engines, or for promotion to freight enginemen.

These rules must be strictly observed on night as well as on day passenger trains.

#### The Texas Flood.

The destruction by the flood of last month in the valley of the Brazos River is so serious and so widespread that even now it is impossible to estimate with any accuracy the enormous damages to property and the losses due to interruption of business. The most comprehensive summary that we have seen is a statement by Congressman R. B. Hawley, who has appealed for relief for the sufferers, and who says:

The disaster is without parallel in our country. At some points the precipitation was three and one-half feet in sixty hours, resulting in a flood of enormous proportions, covering an area of many square miles to a depth of from five to twenty feet, and a loss of from twenty-five to forty million dollars. No less than twenty populous towns have been inundated, as well as thousands of well established and well ordered farms, which, to-day, are in a complete state of desolation. Practically every work animal, every milch cow, together with all stock cattle and every vestige of vegetation, have been swept away, leaving the country completely devastated. Within the influence of this awful disaster resided over one hundred thousand people, almost half of whom are in a state of helplessness to-day, except as they may be provided for by those who are generous and able to assist them.

We have brief reports from two of the six railroads affected. Chief Engineer J. D. Trammell of the International & Great Northern writes:

"Sixty-five miles of track on our San Antonio division between Marquez and Rockdale was badly wrecked. Sixteen bridges and many culverts were swept away, the aggregate length of these being about 3,000 feet. In addition to this the track was cut in two at about ninety places, varying in length from 10 feet to 6,500 feet. Traffic was suspended on this 65 miles for seven days, after which all trains were sent through. The estimated cost of repairs to the track on this portion of the line is \$125,000. The estimated rainfall throughout this sixty-five miles was 42 inches in 36 hours. On our Gulf division, between Chenango and Columbia, we have ten miles of track yet under water (July 16), and the damage is unknown. Traffic has been suspended on this ten miles two weeks up to date, but the water is now receding."

On the Houston & Texas Central traffic was interrupted between Benchley and Hempstead (main line) from June 29 until July 9. Vice-President G. A. Quinlan writes that "the tracks were submerged near Navasota and north of Hempstead for a distance of nearly five miles, there being a depth of from two to ten feet over the rails. This was caused by the flood in the Brazos and Navasota Rivers. Between Calvert and a point north of Benchley the traffic was interrupted from June 29 until July 15. On this portion of the line six bridges were washed out and about 5,000 ft. of trestle. Several thousand feet of heavy embankment was entirely destroyed. Traffic during this period was interrupted at Calvert,



Hearne, Bryan, Navasota and Courtney. On that portion of the line between Hempstead and Austin, known as the Austin Branch, there was water over the tracks in the vicinity of the Brazos River for a distance of more than two miles; deepest water over the top of rail here, 9 ft. 6 in. Traffic was interrupted on this portion of the line from June 29 until July 11. The principal stations affected were Chappell Hill, Brenham, Burton, Carmine, Ledbetter, Giddings, Elgin, Manor and Austin. On the Waco Branch, between Waco and Bremond, four bridges were entirely destroyed, but the road was made passable and traffic resumed on July 11. It is impossible at present to give an estimate as to the financial extent of the losses, but the damage to property will be enormous."

The Gulf, Colorado & Santa Fe, except one short branch, was re-opened for traffic in the flooded district on July 17. This road was damaged by the flooding of the roadbed, but lost no important bridges.

#### New Passenger Cars for the Empire State Express.

Four 72 ft. passenger cars have been built at the Buffalo Works of the Wagner Palace Car Co., for the Empire State Express of the New York Central & Hudson River Railroad. The length of cars over the platforms is 79 ft. 5½ in., the width over sills 9 ft. 8 in., and the width at eave mouldings 10 ft. ½ in. The cars have been built with steel platforms made by the Standard Coupler Co., and with the Wagner standard composite iron and wood framing.

The cars have the Wagner standard wide vestibules with automatic action trap floors over the steps. The interiors of the cars are finished in solid St. Jago mahogany, relieved with inlay work. The ceilings of the cars are of 3-ply white wood faced with white enamel with Pierre Carton ornamentation in Empire designs, the raised portion of the ornamentation being treated with gold leaf. Crystallized glass is used in the deck sash and transom sash. The seats and backs are the Scarritt patent with high backs and head rests; the upholstery being in blue moquette. The window curtains are made of Pantasote, and have the Forsyth patent fixtures for raising and lowering. The cars are lighted by Pintsch gas. The lamps, basket racks and other metal trimmings in the cars are of red bronze. The cars are heated with straight steam, and are equipped with Westinghouse air brakes with brakes on all wheels, Wagner standard 6-wheel trucks with 36 in. steel tired wheels and with Gould draw bars.

#### Statistics of the Railroads of the United States to June 30, 1898.

The Interstate Commerce Commission has issued an abstract of the forthcoming Statistician's Report of the operations of the railroads of the country for the fiscal year that ended one year ago. From this abstract we copy the items shown below, with figures for the preceding two years. These last are taken from the similar statement published in the Railroad Gazette of Sept. 2, 1898, in which were also given the totals for 1895.

##### Railroad Statistics for Year Ending June 30.

	1898.	1897.	1896.
Miles of railroad completed...	186,396	184,428	182,777
Increase in 12 months.....	1,968	1,652	2,120
Miles of track.....	247,533	243,444	240,129
Miles of road operated.....	184,648	183,284	181,983
Number of corporations.....	2,047	1,987	1,985
Number in hands of receivers.....	12,746	17,862	30,476
Mileage in hands of receivers.....	36,234	35,986	35,950
Locomotives.....	33,695	33,626	33,003
Cars, passenger.....	1,248,826	1,221,730	1,221,887
Cars, freight.....	1,326,174	1,297,480	1,297,649
Cars, total.....	2,574,999	2,519,210	2,519,536
Cars and eng. with p'w'r br'ks.....	641,262	525,286	448,854
Cars with automatic couplers.....	909,574	678,725	545,583
Employees.....	874,558	823,476	826,620
Employees per 100 miles of road.....	474	449	454
Employees in M. W. dep't.....	142	83	134
Employees in Maint. equip't.....	93	83	92
Capital stock, com'n, millions.....	\$4,269.3	\$4,367.1	\$4,256.6
Capital stock, pref'd, millions.....	1,119.0	997.6	970.0
Capital stock, total, millions.....	5,388.3	5,364.7	5,226.6
Funded debt, millions.....	5,430.3	5,270.4	5,340.3
Current liabilities, millions.....	540.0	578.5	.....
Total stock and f'd debt, millions.....	10,818.6	10,635.0	10,566.9
Total stock and f'd debt per mile of road.....	60,343.0	59,620.0	59,610.0
Dividends paid, millions.....	96.2	87.1	87.6
P. c. st'k rec'd'g no dividend.....	66.3	70.1	70.0
P. c. bonds rec'd'g no interest.....	11.3	13.6	16.3
Av. div. on div-paying stock.....	5.3	5.4	5.6
Gross earnings, year, passenger, millions.....	\$267.0	\$251.1	\$266.6
Gross earnings, year, freight, millions.....	876.7	772.8	786.6
Gross earnings, year, total, inc. misc., millions.....	1,247.3	1,222.1	1,250.2
Av. of same per mile.....	6,755.0	6,122.0	6,320.0
Operating expenses, millions.....	818.0	752.5	773.0
Net earnings, millions.....	429.4	369.6	377.2
Other income, millions.....	138.2	125.1	129.0
Net income, millions.....	567.6	494.7	506.2
Fixed charges, etc., millions.....	427.2	413.4	416.6
Net avail. for div., millions.....	140.3	81.3	89.6
Dividends paid, millions.....	96.2	87.4	88.1
Passengers carried, millions.....	501.1	489.4	511.8
Passengers, one mile, millions.....	13,378.9	12,256.9	13,049.0
Freight carried, million tons.....	379.0	741.7	765.9
Same, one mile.....	114,077.6	95,139.0	95,328.4
Employees killed.....	1,953	1,693	1,861
Employees injured.....	31,761	27,667	29,969
Passengers killed.....	221	222	181
Passengers injured.....	2,945	2,795	2,873
Other persons killed.....	4,680	4,522	.....
Other persons injured.....	6,176	6,269	.....

The operated mileage differs from the total length because some sections of road are used by two or

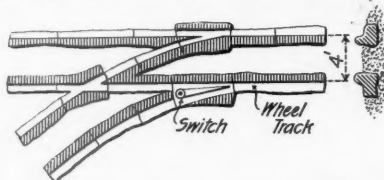
more companies, and because some roads do not promptly send in their reports.

The Statistician repeats his former recommendation that there should be established under the jurisdiction of the Commission a bureau of statistics and accounts, which shall have as its chief purpose the establishment of a uniform system of accounts for the carriers. He also deems it desirable to provide for a monthly report of the earnings and expenses of operating railroads.

#### The Heytor Granite Tramway.

By W. B. Paley.

In an out-of-the-way corner of the West of England there may be found one of the earliest, and perhaps, the most nearly unique of all railroads. What there is left of it extends from a point on the Moreton Hampstead branch of the Great Western, about 1 mile south of Bovey Tracy, in Devonshire, up to the quarries at Heytor, on Dartmoor. These quarries produce a splendid quality of granite and in 1820 their owner, Mr. George Templer, laid from them a railroad composed of granite blocks, and of nothing else. These blocks formed both the rails and the sleepers in themselves, the outer half of the top surface being cut away longitudinally to form a wheel track. This track averages about 4 in. in width, but is often 5 or 6 in., whilst the depth of the cut is somewhat less. The inner raised portion, of course, formed a flange to keep the wheels on the line. No means of preserving the gage are anywhere adopted, and owing to a tendency of the blocks to tilt, from the weights coming nearest their outer edge, the gage varies about 3 in. On the best preserved portions of the line, however, it is 4 ft. and from many measurements the writer believes this may be taken as the actual gage. The granite blocks are quite roughly hewn all over, the ends being only sufficiently dressed to enable a fairly close fit to be made between one block and the next. They are not in any way joined. It is said that small pieces of oak have been found sometimes under the



Granite Railroad Track. Laid in 1820.

ends, apparently to prevent them sinking, but this lacks confirmation. In length the stones differ considerably, from 4 ft. or so to nearly 8, but perhaps 5½ ft. is the most usual size, by about 1 ft. square.

Commencing on the north side of Heytor Rocks, in five or six working faces, the branches unite with the main line, as the longest branch may be called, on Heytor Down, at about 1,200 ft. above sea level. At each of the junctions the hole which contained the heel of a switch may still be seen, but the switches have long since disappeared. No other ironwork seems to have been used. On these breezy downs nothing grows except grass and furze bushes and the bare white stones of the old tramway are as clean as if scrubbed every day. The line runs alongside the road from Bovey to Widecombe. Here some portions have been dismantled, the blocks lying about in disorder. At Lower Down the line is about 500 ft. above sea, having fallen 700 ft. in 3¼ miles. Through the woods and on the down the line is greatly grown over with moss and furze, and, in fact, it is difficult to find it here and there. Near Bovey grammar school the line crosses a small stream by what is surely the most primitive railroad bridge in the world, simply four large stone slabs thrown across. Two of these have a groove cut in for the wheels to follow. The stream is about 10 ft. across, the bridge itself being 14½ ft. At Newton Abbot the line crosses another stream by a broken down wooden bridge and then ends at the Great Western Railway at Bovey gas works. Originally it went on two miles further to the head of a short canal near Teigngrace, but this portion was used in making the Moreton Hampstead line in 1862-6. On the parapets of the bridges over the latter may be found portions of the old granite blocks of the Heytor tramway, used as coping stones. The canal in question was made in 1792-4, branching from the river Teign for the convenience of the pottery works.

The stone was taken by the canal in barges to Teignmouth for shipment. Most of the granite in the western face of London Bridge (built 1825-31) came down over the Heytor tram, as did the columns of the general post office (1829) and the Waltham obelisk at Ludgate Circus, 1835. Rough and ready as it is, the tram was capable of real work and was in use more or less for nearly 40 years. Since then it has been disused for another 40. The quarries are now only worked when some specially large and long piece of granite is wanted, which is brought down by road. The line probably falls another 400 ft. from the center of Lower Down to the present termination, or about 1 in 30, so that considerable brake power must have been needed in coming down.

The remains of an old wagon or truck are to be seen in one place, it is quite flat and without sides, consisting of three longitudinal timbers with close cross-pieces on the top. It runs upon four cast iron wheels of 2 ft. diameter, 3 in. wide on the tread, with six spokes curving outwards to a journal 10 in. long. The wheels, of course, run loose on the axles, with a liberal amount of side play. The truck is lightly constructed, is 13 ft. long, 4 ft. wide, with a wheel base of 10 ft. A smaller truck or cart having shafts for a horse was used as the leading vehicle of a train.

There is not a single passing place or siding throughout the line, which may now be considered as seven miles long, including one and a quarter miles of branches at the quarries. Altogether it is an exceedingly curious and interesting piece of work, but having been made by a private individual for his own purposes, without an act of Parliament, it has never attracted the slightest attention or notice. It was opened for traffic Sept. 16, 1820. Mr. Templer was his own engineer. In 1829 the line and quarries were sold to the Duke of Somerset, in whose family they still remain.

#### The Outlook for Contracts in the Transvaal.

South Africa offers a new field to the American engineering contractor in railroad building and in similar work, such as building reservoirs, dams, etc. By a contracting engineer I mean the man who, by careful calculation, taking chance and luck into consideration, clears the way before him for his action in the field. The difficulties of contract work in Africa are great, but are not so visible to the newcomer as to the engineer who has been some time in the country and has obtained insight into the peculiar circumstances which surround the country and people.

It requires considerable time and study to learn the workings of the native mind. It is true that the chief incentive to the native for work is that he may make money for his absolute necessities, yet great numbers do not come solely on their own account, and large sums of money must be spent on agents, and for other expenses, to induce them to come even from Mosambique. If fairly treated they are great workers, and contractors who are ready to pay good wages will get good work in return. It is in the interest of the contractor to pay them comparatively high wages, and there is then no necessity "to make them work." An example of this is found in the experience of one contractor for excavation, rock work, etc. He has always a good set of native workmen at his command. He pays double the usual wages, less the food which he himself supplies, and he figures that on this basis two men working for him will do as much work without urging as four or five of the ordinary workers at the mines. He has been in Africa many years, and speaks Dutch (Hollandish) and Zulu. He has an office in Johannesburg, and easily gets all the natives he needs and keeps them.

In making estimates for a new railroad contract it will be necessary for the contracting engineer to visit that part of the country within which his contract confines the work, so as to estimate carefully the available labor supply and the rate of wages, all of which vary greatly. The native population in the whole eastern part of Africa is numerous and increasing, yet it is not always easy to get men to work. Freights are very high, and when depending upon the ox wagon the rates vary widely and are subject to supply and demand and the changes of the season. Present prices for contracts at the mines near Johannesburg are as follows:

Engine foundations (in lime).....	35s	(\$8.75) per cu. yd
" (in cement).....	42s. 6d.	(10.50) "
Brick work set in cement.....	54s.	(13.50) "
Stone work set in lime.....	27s. 6d.	(6.87½) "
Excavation in soft ground.....	1s. 3d.	(0.32) "
Excavation in rock.....	1s. 9d.	(0.44) "
Filling in.....	1s. 3d.	(0.32) "

I present a translation from the "Staatscourant," the official Government Gazette of the Transvaal, which is printed in Dutch. This paper is published in Pretoria every Wednesday, and arrives here the following Thursday morning. The one of June 7 contains a call for tenders for the Rustenburg and Lijdenburg railroads, and is the first publication of the same.

##### Invitation for tenders for the building of:

1. A railroad from Belfast via Dullstroom to Lijdenburg, commencing at Belfast or nearby with the railroad Konati-poort, Pretoria.
2. A railroad from Pretoria connecting with the Pretoria-Pietersburg railroad station via Skinnerscourt and Krokodilpoort to Rustenburg.

According to a decision of the First Volksraad [Senate of the Transvaal], article 1,814 of Nov. 23, 1898, is made known herewith, that tenders shall be delivered at the office of the Government Commissioner for Railroads at Pretoria up to Thursday, Aug. 3 next, for the Rustenburg line, and up to Thursday, Oct. 12 next, for the Lijdenburg line. In both cases up to 12 o'clock noon. The applicants must give, completely and accurately:

- 1a. The amount of costs per unit upon which the line shall be built.
- 1b. The amount of costs in the whole. (This shall be given in both cases).
2. The manner in which payments will be desired.
3. The rate at which 4 per cent. Government obligations will be accepted in payment.

Further conditions and details described in a draft of the contract for both lines can be obtained separately after July 1,



1899, at the office of the Government Commissioner for Railroads, upon the payment of £1.

Tenders must be written in the language of the country and marked on the cover "Tender for the construction of the line Belfast-Lijdenburg," and "Tender for the construction of the railroad Pretoria-Rustenburg."

Further information can be obtained at the office of the Government Commissioner for Railroads, and from the Technical Inspector, the Chief Engineer for Railroads for the South African Republic.

The plans are open for inspection at the office of the Technical Inspector, the Chief Engineer for Railroads in the South African Republic for the Rustenburg line from July 7; for the Lijdenburg from Sept. 7.

J. S. SMITH,  
Government Commissioner for Railroads.

Pretoria, May 26, 1899.

The above invitation for tender is a good example of similar work in this country. You will notice that the limited time does not admit of carrying on the business of contracting from your side. A final cable or two of "Yes" or "No" is all that is available. For an American railroad contracting firm to enter this country to build railroads, docks, harbors, etc., the services of an engineer would be required who has for years been resident here, is well acquainted with all the respective circumstances, and can so watch carefully all the enterprises coming within the scope of the country. From the time that the Senate and the government authorized the building of the two lines given above your engineer would need to keep in touch with the engineers' staff of the railroad offices at Pretoria. After the survey is made he would need to go more than once over the whole line proposed, carefully examining the projected road, the adjacent country, the formations and conditions of the ground, the native labor supply, questions of wages, freight rates, supplies, etc. As far as the available information may offer, he would need to send preliminary calculations to the American firm.

You notice that the invitation was signed May 26, and publication of the same was received in Johannesburg June 8. By being acquainted at Pretoria your engineer might obtain that information so that he could forward it to America about two weeks sooner. The specifications, which, according to the advertisement, could not be had before July 1, the engineer would have on hand, and, of course, a copy could be sent to America if desired. The American company would then need to send a representative with full power to examine the matter prepared by the engineer here, to go over the ground himself to settle the pending questions, and to submit the tenders for the work and make the arrangements for building the line, etc.

G. W. W.

Johannesburg, June 9.

#### Southern Pacific Terminal at Oakland.

The passenger terminal of the Southern Pacific Company at Oakland, Cal., built in 1881, has recently been re-arranged and improved. It now consists of a mole in San Francisco Bay 1.4 miles long, which has four tracks the whole length. For 5,400 ft. there are four tracks and a wagon way. From this point the embankment is widened to carry 20 tracks and a wagon way for a distance of 1,200 ft. The connecting ferry slip extends 650 ft. beyond the embankment, making a total distance from the easterly shore of the bay to the end of the ferry slip of 7,250 ft.

Fourteen of the twenty tracks, Nos. 2 to 15 inclusive, terminate in or pass through the train shed. Tracks 1 and 16 are used for locomotives "running around" trains. Tracks Nos. 17, 18, 19 and 20 are mainly used for the storage of suburban passenger cars.

The extreme length of the train shed is 1,050 ft.

separate building 40 ft. x 92 ft. adjoining the north-erly train shed.

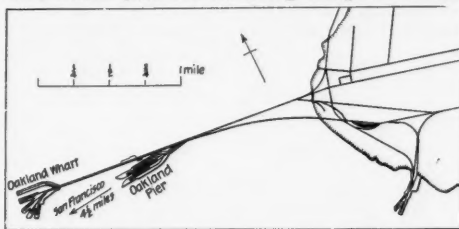
Ferry boats ply between this station and the foot of Market Street, San Francisco, a distance of  $4\frac{1}{2}$  miles, every thirty minutes, carrying passengers in connection with overland, local and suburban trains. Tracks 2, 3 and 4 are principally used for in-bound overland and local trains. Tracks 5, 6, 7 and 8 are for out-bound overland and local trains. Tracks 10, 11 and 12, separated from the other tracks by iron

There are interlocking switches and signals at the terminus and at the shore end of the mole. Tower No. 2 is at the shore end. Train movements in and out of the terminal station are controlled from signal tower No. 1, located 550 ft. east of the train shed. The space between the towers is covered by automatic block signals. The interlocking is the Westinghouse electro-pneumatic. The signals are all of the semaphore type, except near the train shed, where pot signals are used.



Terminal of the Southern Pacific at Oakland, California.

fences, are used alternately for in-bound and out-bound suburban trains, three lines of which are run at half-hour intervals from 6 A. M. to 7 P. M. and once an hour from 7 P. M. to midnight. One line runs to and from the city of Alameda, one to and from the city of Oakland and one to and from the city of Berkeley. The cars of these trains arriving in-bound, connecting with the ferry boat, remain on these tracks (without switching except to attach or



Oakland Mole; Freight and Passenger Terminals of the Southern Pacific Company

detach cars, according to the requirements of trips at different times of the day) and are moved with out-bound passengers from the next boat to arrive. The locomotives of these trains, which run in either direction without turning, are moved through track No. 16 to the easterly end of the train shed; and in certain cases they take out-bound trains from tracks 13, 14 or 15 in the adjoining enclosure, connecting with same boat for which they arrived with in-bound trains. In other cases they await the arrival of the next boat. Coal and water for these engines are taken on track No. 16. Cinders are drawn into pits located just east of the train shed. Pipes lead from the bottom of these pits, and by the use of water the cinders are flushed into the bay.

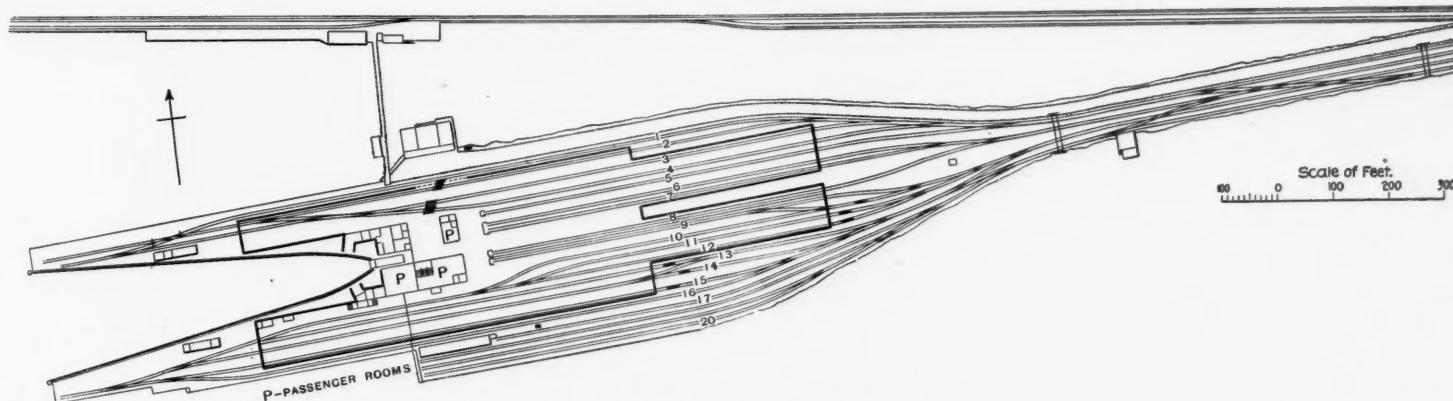
Tracks 13, 14 and 15 are separately enclosed and

The average train movement in both directions under signal bridge No. 1 for 24 hours is: Regular trains, 250; switching movements, 700; total, 950.

#### Expert Medical Testimony in the Courts.

At the last meeting of the Claim Agents' Association, which was held in Buffalo May 24, William J. Herdman, M. D., LL. D., of the University of Michigan, delivered a thoughtful address on medical expert testimony from a physician's standpoint. Dr. Herdman began with a review of the very unsatisfactory state of things now existing throughout the United States. Expert testimony before the courts is almost always looked upon as one-sided and often is so biased that little weight can be attached to it. So many so-called expert witnesses have given testimony which has not promoted the cause of justice that the whole matter is a scandal. After describing the difficulties in the way of improving the condition of things under the prevailing method of procedure, Dr. Herdman goes on to recommend his remedy. Competent and honest men must be chosen for medical experts; they must have access to all the facts, and must be virtually officers of the courts. In France experts are appointed by the courts, and a board of three is generally appointed in each case. They must report in writing, and dissenting opinions must be in writing, with the reasons for dissent. The judges are not bound by the report. In Germany the parties to a suit may agree upon experts and the court will appoint those agreed upon, though it may limit the number. In Prussia a physician and surgeon is appointed for every county and there is a Board of Appeal which may be resorted to when experts disagree.

Six medical societies in Chicago have recommended a bill to the Illinois Legislature. Under this proposed law circuit and superior courts would appoint expert witnesses in medical and other sciences for



Southern Pacific Passenger Station at Oakland Pier.

Note.—The space at the north side of the station and tracks is a wagon road.

and the extreme width 265 ft. The head house, containing offices and waiting rooms, is covered under the main train shed. The offices are lighted with Pintsch gas, supplied from the pipe and storage plant provided for supplying cars, and the main waiting room and train sheds have electric arc lamps.

The building is heated with steam, supplied from a boiler house 16 ft. x 36 ft. north of the train shed. Rooms for the news stand, the Pullman Sleeping Car Company and for the restaurant are provided in a

are also used for out-bound and in-bound suburban trains alternately and in the same manner as tracks 10, 11 and 12.

Exits and entrances from ferry boats to trains are provided independently in the head house, so that suburban passengers passing from the ferry boat to trains on tracks 13, 14 and 15 move along passageways, separated from those along which suburban passengers pass at the same time from trains on tracks 10, 11 and 12, into the waiting rooms and vice versa.

terms of one year each, such witnesses to have had five years' practice. A similar movement has been started in Pennsylvania and a bill is now before the Legislature of that State. This bill provides that where an official expert is appointed by the court the parties to a suit shall not have the privilege of calling their own experts, as now. This bill provides a penalty if an expert makes known his opinion before the trial; and there is a section abolishing the use of hypothetical questions.

(Continued on page 525.)





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#### EDITORIAL ANNOUNCEMENTS.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

On Wednesday morning of this week the long-looked-for decision in the suit of the Westinghouse Air Brake Company against the New York Air Brake Company, in the matter of infringement by the latter company's triple valve, known as the C valve, was made public. The decision was rendered in the U. S. Court of Appeals and was written by Judge Shipman. We have not yet received a copy of the decision, and therefore shall not undertake to give any abstract of it. The abstracts published in the newspapers, however, show that it is in favor of the New York Air Brake Company. We hope to be able to treat the matter at some length in our next issue.

Probably a good many have been interested in the letters published in our issues of July 7 and 14 regarding the method of calculating the results of the heat tests of car wheels made by Prof. Goss and reported in our issue of June 9. Others have written regarding these tests, but we not been permitted to publish their letters. It is a rather significant fact, however, that of the several methods proposed for calculating the intensity of the heating effect of the thermal test no two are in agreement. Copies of these letters have been forwarded to Prof. Goss, who is in Europe, and in due time our readers will probably know the reasons for selecting the particular method used in the tests. This explanation is made now, as some might wrongly construe the silence of those who conducted the experiments.

The Chronicle's compilation of gross earnings for June shows a gain of 14.06 per cent., or almost \$6,000,000. In ratio and in amount this is the best monthly statement for over a year. The Chicago, Milwaukee & St. Paul shows a gain of almost \$650,000; the New York Central gained \$560,000, the Northern Pacific \$410,000, the Great Northern \$302,000, the Southern Ry. \$277,000, the Louisville & Nashville \$252,000, the Canadian Pacific \$214,000, the Norfolk & Western \$211,000, and the Missouri Pacific \$203,000. These are the only roads which had gains of over \$200,000, but there were eight more with gains of over \$100,000 each. The increased earnings were spread pretty well over the country. In the half year ending with June 30 the increase in gross earnings was \$17,867,000 on 122 roads and \$12,373,000 on 31 roads reporting for five months only. It is estimated that the gain for the six months for the whole United States will be between \$35,000,000 and \$40,000,000, but this follows a half year in which the gain as recorded was \$57,440,000 and as estimated was about \$70,000,000.

In a recent issue of Bradstreet's we find the following paragraph quoted from a paper published in Lima, Peru:

That which will undoubtedly be conducive of the greatest development of pan-American commerce will be the construction of the central railroad, which, traversing the three Americas from north to south, will, in the end, unite New York

and Buenos Ayres. The greatness of the work predisposes one to consider it Utopian; but when one considers that of the 10,223 miles which separate the northern from the southern metropolis 4,762 are constructed, and the execution of the remaining 5,461 only requires the expenditure of \$174,000,000, of which more than \$100,000,000 would be spent within the United States itself in the purchase of rails, rolling material, bridges, etc., it ceases to appear so difficult to realize a work which already has its principal branches, as would be the lines from Oroya to Callao, from Puno to Mollendo, from Oruro to Antofagasta, and from Rosario to Mendoza, and from Santiago to Valparaiso, not to mention the Mexican Railroad. But a few years ago still more difficult appeared the realization of the construction of a railroad across the continent of Africa, beginning at Cairo and ending at Cape Town; nevertheless, to-day it is no longer a matter of doubt that within a relatively short time that road will be in operation.

Concerning this it may be as well to say a word further, possibly to correct some misapprehensions. The figures are undoubtedly taken from the report of the Intercontinental Railway Commission. In Volume I of that report, on page 159, is the statement that 5,456 miles must be built to complete an all-rail line between New York and Buenos Ayres. The estimate is there made that this can be built for about \$175,000,000. This is only an estimate based on very meagre information, but it should be stated further that even this estimate covers only grading, masonry and bridges. To it we must add the cost of rails, of ties, of rail fastenings, of laying the rails, of ballast, if the road is ballasted, of telegraph line, water service, stations, sidings and their fixtures, signals, shops and rolling stock. In other words, we might easily double this estimated cost, but, for the sake of liberality, we will add only 75 per cent., making the total cost of this little link to be filled in to complete the Intercontinental Railroad, about \$206,000,000. It will be observed that the South American editor disposes in a like airy way of the Cape-to-Cairo Railroad, having no longer any "doubt that within a relatively short time that road will be in operation." Of course he cannot be disputed or controverted successfully, because nobody knows what he had in mind when he said a relatively short time. Relatively to eternity, yes; but within 25 years, no. Within a month we have had the opportunity to talk with a member of the firm of engineers who are carrying out Mr. Rhodes' project for the northward extension of his African railroad. From that gentleman we learn that it is not in contemplation to build a Cape-to-Cairo railroad, and we have long supposed this must be the case. It is proposed to build three links connecting existing waterways. One of these, the railroad to Lake Tanganyika, which will be about 800 miles, is probably provided for. Two more of these links, each possibly 150 miles long, perhaps not more than 125, will perhaps be built within a few years, and perhaps not. That will depend a good deal upon the results of completing the line of communication from Cape Town to the northern end of Lake Tanganyika.

#### The Ton-Mile Rate and a Great Consolidation.

The average ton-mile rate of a railroad is a valuable bit of knowledge to possess. "Other things being equal," this average, for a series of years, affords an index of the extent to which the public, as a whole, is having its transportation tax lightened by successive reductions in rates. As "other things," taking the different lines of a railroad company as a whole, often remain about the same from year to year, this average receipt frequently conveys intelligence even to the editor, the stockholder and other persons who, speaking broadly, are allowed to know very little about the details of the profits of railroads, except as they can be guessed, as in the case of large transactions in single commodities in which the rates are known and the volume can be estimated. If a road can show that its average receipt this year was five mills, while last year it was six, that is an indication that the average of the rates paid by the public has fallen one-sixth.

But having got this far, we have nearly or quite exhausted our subject, as far as anything affirmative is concerned; and our present purpose is to note briefly what the ton-mile average is not good for. The subject has been well discussed before, and by competent hands; but in many quarters the rationale of the matter does not seem to be grasped. It is called to mind at this time by a paragraph in one of the numerous editorials recently published on the proposed lease of the Boston & Albany Railroad to the New York Central. The article before us is neither shallow nor ignorant, nor is it one of the many which are composed chiefly of Wall Street views; and yet the writer appears wholly unable to see how the average freight rate can be maintained at nine mills in Massachusetts when it is six in New York. The reduction of the Boston & Albany average of nine mills to that of the Central, which is six, being regarded as inevitable, the writer in question

naturally concludes that the Central will have considerable difficulty in working the B. & A. so as to keep the profits up to the standard that has been maintained in the past.

To estimate an average at its true value we must note with care what it is made up from. In freight receipts we have to consider (to take the Central and Boston & Albany for an example) (1) the class of freight, whether yielding high rates or low; (2) the distance which it is hauled and (3) the absolute and relative quantities of the different classes. In addition to this we have generally to consider the direction the freight is hauled, whether all in one direction, necessitating the return of the cars empty; or the more economical condition of two-thirds in one direction and one-third the other; or the most economical, of equal quantities in both directions, with the minimum of fluctuations from week to week. It needs but a moment's consideration of the points that we have noted to see that the present difference between the Central and the Boston & Albany averages may continue indefinitely. Any one who has the confidence of a director of either road who takes an interest in traffic details can doubtless get a much more satisfactory explanation than we can give him; but in the absence of "inside" information, let us look for a moment at what is on the surface.

The principal difference is that in Massachusetts there is a large proportion of high class freight, carried short distances. This, in a general way, pretty nearly explains the whole difference; but this statement, when looked into, means a good deal. A short haul not only costs more per mile for simple movement, but also raises the average on the whole volume of freight, because the two terminal charges make a much larger proportion of the whole price. The Boston & Albany carries cotton goods and paper 50 miles, where the Central carries them 300. (The factories of Massachusetts are numerous and their products—cotton, woolen, straw and paper—are high class, from a traffic standpoint.) Terminal charges of one cent at each end make one-fifth of a ten cent rate, but only one-fifteenth of thirty cents.

The Central is in a more competitive territory. The B. & A. has competitors, but both they and it have, by reason of the denser population in Massachusetts as compared with the interior of New York, more important interests in local traffic, which is to a considerable extent non-competitive. It might be said that the B. & A., having made its profits secure, ought to reduce its rates without the stimulus of competition; but here it must be noted that the higher prices have not gone wholly or chiefly to swell dividends; the same density of population which makes local traffic heavy has compelled the expenditure of millions of dollars for improvements, such as bridges for highway crossings. New York has had lower rates, but has gone without the bridges.

The New York Central is one of the lines from Lake Erie to the Ocean which are called upon to carry a great volume of grain, flour and coal. All of this must be taken at low rates or be given up to roads which need earnings very acutely. And the Central not only has sharp competitors; it has a forty million dollar investment in freight tracks (not to mention the West Shore Railroad), which makes it a little hungry itself. It has provided not only main tracks for moving eastward fifteen or twenty thousand cars a day, but also a large equipment of cars and engines, so as to be able to give prompt service in the Autumn rush. If, while these vehicles are idle in the Summer, a few thousand cars of corn can be got away from the canal it will keep the trainmen and the elevators employed and keep the cars from rusting out; but the price will have to be so small that the average ton-mile rate for the year will be brought low. The average for the corn itself would be so low as to frighten a Massachusetts railroad stockholder.

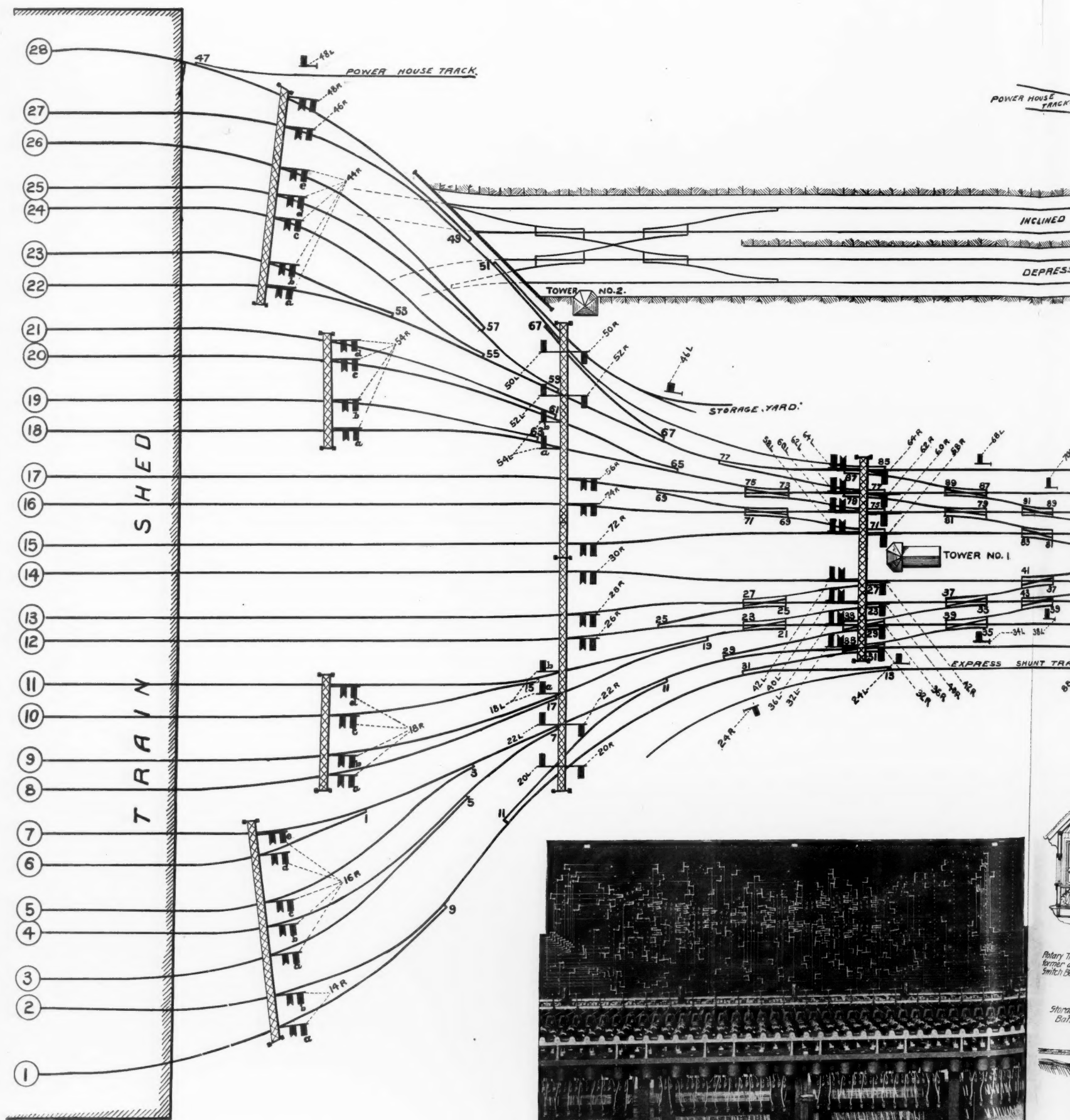
A stockholder who had been taught to judge by the average rate, once began to complain to the traffic manager of his road when he saw that the ton-mile rate for the year had dropped a large percentage below that in the last preceding report. Why, said the traffic manager, that is a sign of prosperity! It means that we have carried a largely increased proportion of low class freight, which is the kind on which, at present, we make a much better profit per train mile than we do on high class freight. The traffic manager knew, what did not appear in the published report, that the other freight had held its own and that the additional low class traffic was pure "cream." Even when the number of tons of each commodity is stated in an annual report, the outsider must be cautious about accepting the indications of such figures as final, as they never tell how far the freight is carried.

Thus we see that a change in the average receipt may or may not mean a change in profit. We have



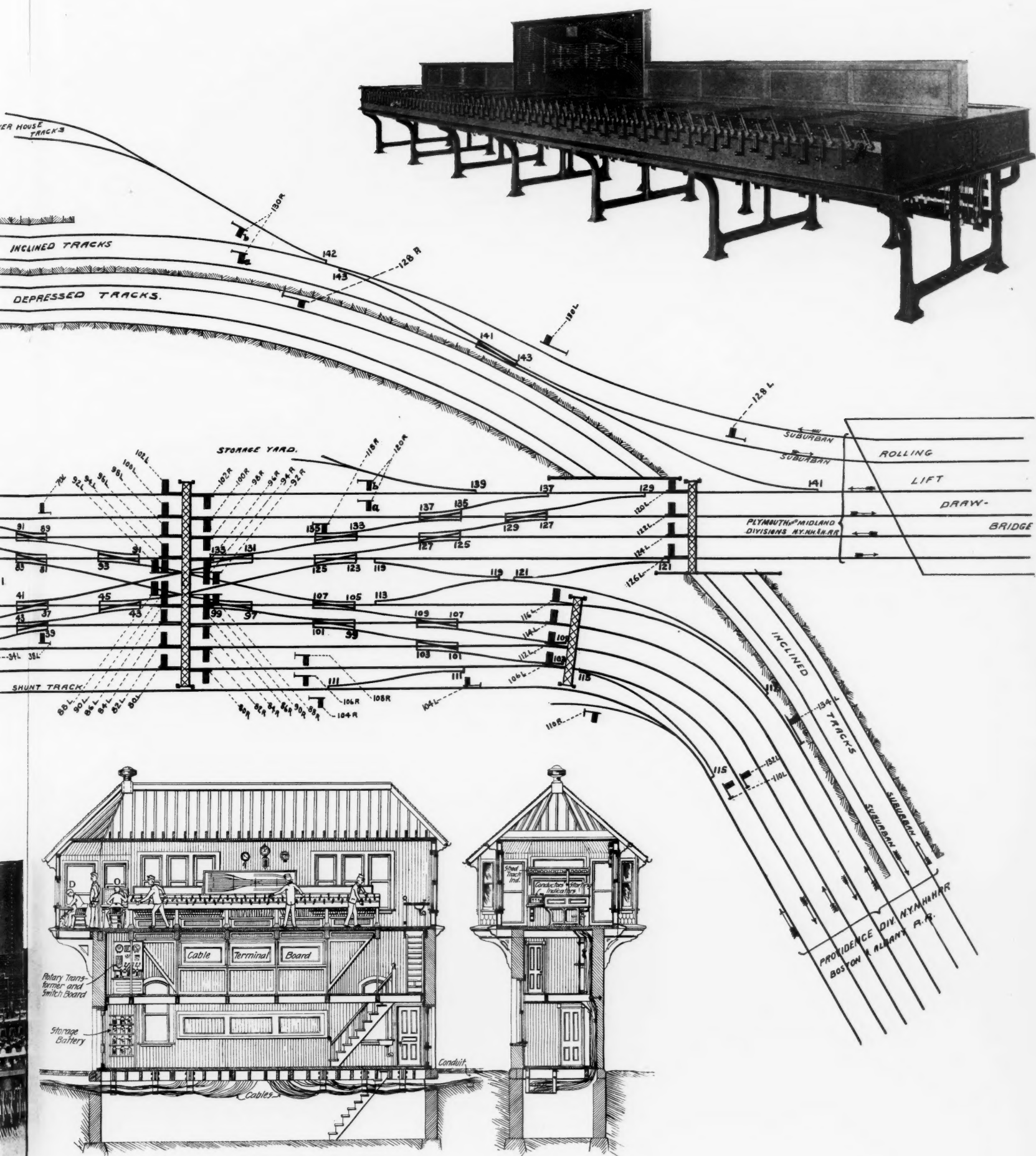






ELECTRO-PNEUMATIC INTERLOCKING OF SWITCHES AND SIGNALS AT THE BOSTON SO  
Plan of Tracks (not to Scale) Showing Relative Positions of Switches and Signals; Front View of Interlocking Machine Rear View





References—D, Director; O, Operator.

THE BOSTON SOUTHERN STATION—BY THE UNION SWITCH & SIGNAL COMPANY.

Machine Rear View of Track Model and Part of Interlocking Machine; and Longitudinal and Transverse Sections of Tower.



U  
a  
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cited reasons which tend to justify the higher rates in Massachusetts. So far as we can judge, they do actually justify a decided advance over New York State rates, under present conditions. It would hardly be profitable at this time to consider the cost per ton per mile (if we knew all the available facts), for in any event it would have to be largely a matter of opinion. Indeed, the one condition of which the student of monthly statements of railroad gross receipts should most frequently remind himself is that he sees only one side of the shield. A traffic manager sometimes increases his gross receipts ten per cent., while at the same time he is actually impairing his net receipts. What the investor wants to know is the course of the net receipts; and he puts up with statements of gross receipts simply because it is impossible to get anything better.

The foregoing are reasons which any one can appreciate without traveling over the roads; and in considering them we have not forgotten that competition may reduce rates without regard to the cost of service. But another important reason for the nine-mill rate is found in the hilly nature of the Boston & Albany's country as compared with the line of the Central. The maximum main-line train load, with the same engine, must be from 30 to 50 per cent. less on the Boston & Albany than on the Central. Add to this the very much smaller absolute volume of car-load traffic and the shortness of the main line, reducing the proportion of sixty-car trains and we have a factor which must account for much of the difference in rate which has furnished the text for this article.

We have thus recounted the principles affecting rate averages at some length, for the reason that they apply, in one form or another, to a great many other comparisons. The fact that two roads are alike in magnitude of traffic per mile of road, or in skill of management, or in supply of modern cars and engines, or in solidity of roadbed and amplitude of terminals, or in all of these particulars, affords no conclusive evidence that their rates should or can be alike, or that, if they were, the profits would be on the same scale.

In the foregoing paragraphs we have considered the ton-mile average from the point of view of the railroad stockholder. But the publicist, the editor or the legislator, in New York or elsewhere, should bear in mind, not only that the average rate is liable to deceive, and has proved deceptive in the past, but that it is often impossible that it should be otherwise. In our opening paragraph we referred to the public "as a whole." This is a very broad term; and the local editor, who usually speaks for only a local of the public, must keep it in mind. The article which we are criticising seems to assume that the New York Central will have to reduce rates in New England (when it comes to operate there), because justice demands that the public there shall be treated as well as the public in New York State is treated. But it is quite possible that this equality already exists. It may be that, on the same goods, the Massachusetts people are paying substantially the same profit to the railroad as are their neighbors on the west. It may be that if the New York Central should omit from its average the receipts on freight which is carried through from Duluth to Liverpool it would be found to be collecting from the citizens of New York about the same prices that the Boston & Albany collects in Massachusetts. When we are considering the rates granted by the New York Central to "the public" we must remember that a part of that public is in North Dakota, England and other far-off regions. Reductions to western farmers and European bread-eaters do, indeed, benefit the people of New York, but somewhat indirectly.

Major Asa Bird Gardner, the District Attorney of New York, is reported to have climbed over the turnstile at a New York elevated station in spite of the remonstrances of the ticket seller, and to have announced his intention of continuing to climb over these obstructions until they are removed. He is reported further to have said "the turnstiles have got to go . . . the maintenance of the turnstile is a misdemeanor under the penal code . . . It is a flagrant imposition upon the passenger to set up this turnstile in his path and require him to perform gratuitously a service worth thousands of dollars to the company." All of this sounds so undignified that we are inclined to believe that the newspaper reports are incorrect. But assuming that they are even approximately correct, the District Attorney sets an example of disrespect for the law and is liable to arrest and fine for disorderly conduct. Until the turnstile is declared illegal by some proper and competent authority, it is presumably legal. It is a well-known and widely used device, and has been for centuries, all over the world. The Manhat-

tan Company is justified in supposing that it can use a turnstile and it is entitled to police protection in such use. The District Attorney might as well climb over the platform gates on the Manhattan elevated cars; and any guard or ticket chopper who collars him and marches him to the nearest police station will be within his right and his duty. We do not propose to enter into the law of this matter, but to point out that the District Attorney has really committed an assault on the interests of the citizens of New York. The Manhattan Company is in the business of making and selling transportation. Anything which diminishes the cost of producing transportation will make the article better or cheaper, or probably both. This is universal experience; it is one of the laws of the evolution of society. The Manhattan Railway Company can lower the cost of producing transportation by the use of turnstiles in some places or at some times. At other times and places the turnstiles would obstruct traffic and hence diminish receipts and hence lead to loss rather than to gain in the company's profits from the production and sale of transportation. The company itself can decide when and where turnstiles can be profitably used and probably no one else can decide this, for no one else has the necessary facts at his command, and in the nature of things it must be largely an experiment. Thus the District Attorney becomes a law breaker and an obstructor of progress, to say nothing of several other things that he might be called, when he inaugurates this kind of a war against turnstiles.

The eleventh annual report of the Statistician of the Interstate Commerce Commission is finished in two months' better time than was the tenth, and the principal totals from the report are given in another column of this paper. The financial part of this report is now so old that the figures are of value chiefly for reference; but the statistics of casualties to persons constitute the first official report for the year to June 30, 1898, that has been published, and these are of incidental value for the light they throw on the discussion concerning casualties to trainmen which arose when the subject of automatic car couplers was agitated in England a few months ago. In that discussion it was shown that the number of employees killed on the railroads of the United States had diminished decidedly in the five years 1893-97, and in some quarters the conclusion was reached that the introduction of automatic car couplers had been a very important factor in this apparently increased immunity from accident. But while the change in couplers did produce an improvement in the conditions as regards the safety of trainmen, it was clear (Railroad Gazette, April 14, 1899) that the very great falling off in the amount of business done by the railroads of the country was the chief cause of the change in accident statistics; and now we have this further confirmed by the report for 1897-8. General business has greatly increased, and the accident record shows a change in the same direction. No very definite comparisons can be made, and the item which bears the most intimate relation to accidents—train mileage—is not reported in the document which is now before us; but it may be worth noting that, while ton mileage (which affords some measure of freight-train mileage) increased 20 per cent., the number of employees killed increased only 15.7 per cent.

A couple of weeks ago "The Chronicle" published a further compilation of the capital authorizations for the first six months of this year. The list of securities amounts to \$3,142,000,000, or, adding the increase in the stock of two great tobacco companies, the aggregate capital represented by this list of undertakings is \$3,201,000,000. All of this is what has happened since the first of January. The list has been prepared with a good deal of care, and is probably as accurate a representation of this situation as could be made without unreasonable labor. At any rate, the figures are near enough to the truth for practical purposes.

#### TRADE CATALOGUES.

Brake Beams.—The American Brake Beam Co., Chicago, has issued a pamphlet of 36 pages which is out of the ordinary. Mr. H. M. Perry was employed to investigate the performance of the solid type of brake beams and this publication is based upon his report. Those who favor spirited reports, that call "a spade a spade," will enjoy this pamphlet, as railroads and brake beam makers alike are mentioned by name and roundly criticised. One road is named that is said to be "actually imperilling the lives of every man, woman and child who ventures to ride over it" by using a particular brake beam.

Numerous engravings, made from photographs, are shown of brake beams that have failed in service and a "partial" list is given of the cars found on which the brake beams have failed. We note that in this list of failures the beams were those of one maker only, but we suppose no one is expected to conclude that this is the only brake beam on the market that ever fails. On the other hand we suppose that it would be possible to find cases of failure of trussed as well as solid rolled beams, and Perry's arguments would

have carried greater weight had he taken a little broader view of his subject.

The pamphlet also contains the results of physical tests of different beams reported by R. W. Hunt & Co., where a comparison is made between the "Kewanee" and "Central" brake beams, wooden beams and various beams of the solid type. The last few pages are given to a description of the trussed brake beams made by the American Brake Beam Company.

Long Island.—The Traffic Department of the Long Island Railroad is enterprising in making known to the public the attractions of the country which that road serves. One pamphlet which we have just received is descriptive of Long Island in general with a map and numerous pictures; another, "Unique Long Island," is a collection of reproductions of photographs, many of which are military, taken during the occupation of Camp Wyckoff. Another is "Summer Homes on Long Island," which gives specific information of hotels and cottages with rates, and so on. Still another, the "Cyclists' Paradise," contains a cycle map and lists of hotels, descriptions of routes, and so on.

Car Heating Apparatus.—The Gold Car Heating Co. has just brought out its catalogue for 1899 and 1900. It is a well made book, 9½ in. x 12 in., with numerous engravings and folding insets. The plan is to illustrate and describe carefully, in general and in detail, the car heating apparatus made by the Gold Company. The first appliance taken up is the straight-port steam coupler, which is fully shown in all its details. This is followed by an explanation of the locomotive equipment for Gold heating, and then the various details of car equipment are given. The Gold systems include steam, hot water, direct steam with storage and electric heating.

Hudson River Day Line.—Mr. W. B. Elmendorf, General Agent of the Hudson River Day Line, has issued a pamphlet of information about the river and the beautiful steamers of the line, and telling also of tributary excursion routes and mountain resorts. Routes, rates and time tables are given. Another pamphlet, calculated to induce people to move the other way is "Summer Days and Nights in New York." This gives information about the city as a summer resort, in which respect it is not without decided attractions.

Baldwin Locomotives.—The Baldwin Record of Recent Construction for May is just received, being a few days behind the June pamphlet, noted last week. The May pamphlet shows locomotives recently built for the Egypt and the Soudan, also consolidation engines and 10-wheelers for some American roads and a compressed air locomotive for the Philadelphia & Reading Coal & Iron Co. Besides these there are a number of examples of engines built to go abroad.

Minerals and Mines Along the Southern Railway.—The Land and Industrial Agent of the Southern has issued a pamphlet describing the mineral deposits of the regions tributary to that railroad. It is needless to say that these are great and varied. Whoever wants specific information should write to that agent, Mr. M. V. Richards, Washington, D. C.

#### Expert Medical Testimony in the Courts.

(Continued from page 523.)

Earnest attempts have been made to secure similar legislation in New York, and a bill has been proposed by a committee of the New York State Medical Society, conforming in a general way to the practice of France. This bill embraces detailed requirements as to the qualification of candidates, compensation, etc. The Board of Regents of the University of New York, which now regulates the practice of medicine in the State, could regulate the appointment of medical experts for the courts in the same way.

The suggestions, taken from all the sources above alluded to, are found to harmonize in the following particulars:

1. Experts should be appointed by the trial judge.
2. Their compensation should be made a part of the expenses of the court.
3. They should have abundant opportunity to investigate all the facts of the case on trial as far as they have a bearing upon the opinion they are expected to deliver.
4. That opinion should be given to the court in writing, signed and sworn to.
5. Any dissenting expert opinion must also be in writing, and contain a statement of the grounds on which the dissent is based.
6. The experts may be sworn as witnesses and cross-examined, but the range of the cross-examination is not to extend beyond the limits of the subjects embodied in the opinion which they have been asked to express.

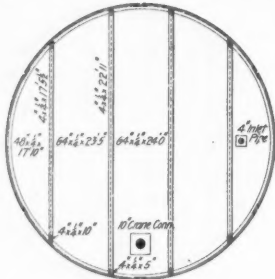
Dr. Herdman commends the New York law under which the Board of Regents tests the qualifications of persons entering the medical profession; and in States where no such Board exists he thinks the representative medical organizations, county and state, might recommend candidates for experts. Where a county expert gave an unsatisfactory opinion, appeal could be taken to the experts selected by the state Society.



### Standard Steel Water Tanks of the Atchison, Topeka & Santa Fe.

The Atchison, Topeka & Santa Fe has recently built several steel stand-pipes for water stations in place of the usual wooden tanks, and in this issue are shown the three standard designs of steel stand-pipes used by that road. In the first size the distance from the rail to the top of the tank is 29 ft., in the second size 43 ft. 1½ in., and in the third and largest size 60 ft. 3½ in.; all are 24 ft. in diameter.

In all of these the stand-pipe is set on the ground, as it was found more economical to let the part of the tank below the outlet remain full of water than to build a tower of any kind to carry the part above. Also, sediment settles in the lower part, and provision is made near the bottom to draw the water off to clean the tank, a sloping bottom of concrete



Plan of Tank.

being put in for that purpose. The foundations consist simply of broken stone or gravel of such depth as to reach a firm foundation, no concrete being used with the gravel or broken stone.

The tanks are riveted by letting water into them and mounting the riveters on a floating platform within the tank. The joints are made water tight by placing a small strip of felt between the over-laps of the plates or between the butt strap and the plates before riveting. Instead of caulking the seams after riveting. The inside of the tank is painted as the work progresses with Edward Smith & Co.'s "Durable Metal Paint," and the outside is painted with a mixture of asphalt and crude California oil. Fixed ladders are provided both outside and inside the tanks. The outside ladder begins about 12 ft. from the ground so that unauthorized persons cannot easily climb it, the man in charge of the water

used for way stations. The second size is put at the more important stations where much water is used, and the third size, 60 ft. high, is intended to be used at terminals and points where it is desired to hold sufficient water for 24 hours' supply, without pumping at night. The valve and the method of supporting the goose neck inside the tank are shown by the detail drawings.

We are indebted to Mr. J. Dun, Chief Engineer of the Santa Fe, and his Assistant, Mr. C. D. Purdon, for drawings and information.

#### TECHNICAL.

##### Manufacturing and Business.

Since July 4th the Pressed Steel Car Company has delivered 168 cars to the Pittsburgh & Lake Erie, 40 to the Lake Terminal operated by the Lorain Steel Co., and 119 on a large order received from the Oregon Short Line. Deliveries of trucks, bolsters, and other pressed steel parts was well up to the average for the past two months.

The Cleveland City RR. will change its motive power on the Superior St. and Payne Ave. lines in Cleveland, O., from cable to electricity. The Superior St. line will be extended.

A semi-annual dividend of \$3.50 per share has been declared by the General Electric Company on the preferred stock, payable July 31, to stock of record July 15.

##### Iron and Steel.

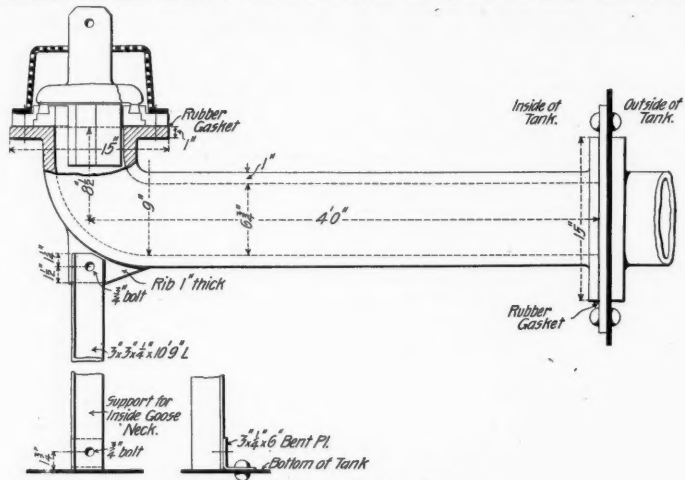
The first quarterly dividend of 1½ per cent. on Bethlehem Iron stock will be paid Aug. 1.

##### Government Work.

Proposals are wanted until Aug. 12 for removing rock in the channel of Port Chester Harbor, N. Y. Address W. H. Benyard, Lieut. Col. of Engineers, Army Building, New York City.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until Aug. 14, for labor and material for building the Hospital building for the U. S. Immigrant Station, Ellis Island, New York. Messrs. Boring & Tilton, Architects, 32 Broadway, New York.

Proposals are wanted at the Supervising Architect's office, Treasury Department, Aug. 8, for plaster



Inside Goose Neck with Support.

referred to and through the Westinghouse Machine Co. orders for 16 similar shafts for the Third Avenue Railroad of New York. It is also stated that 15 shafts of a smaller diameter than those just turned out are to be made for the Westinghouse Electric & Mfg. Co. for the water power plant at Massena Springs, N. Y.

##### A New Dry Dock for Portsmouth, N. H.

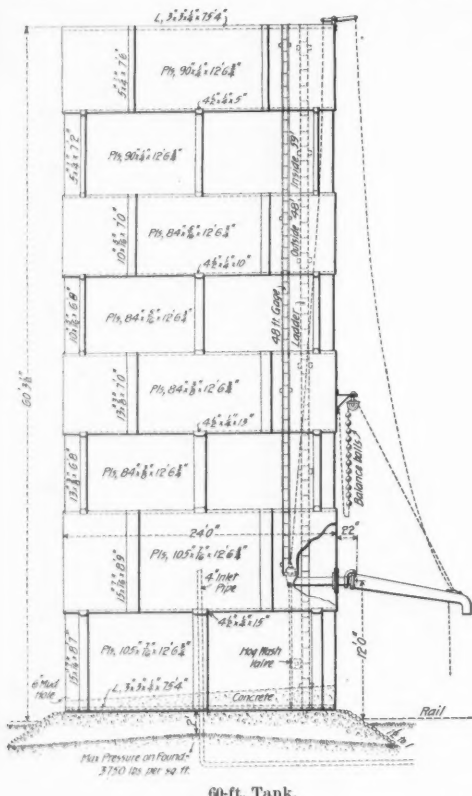
The Navy Department has advertised for bids on the new stone dry dock at Portsmouth, N. H. It is to cost not exceeding \$1,100,000, with dimensions as follows: Length, 750 ft.; depth, 30 ft.; width on floor, 80 ft. Its equipment will be of the latest design, including an electrical plant for pumping and for operating the gates.

##### The Lewiston Bridge.

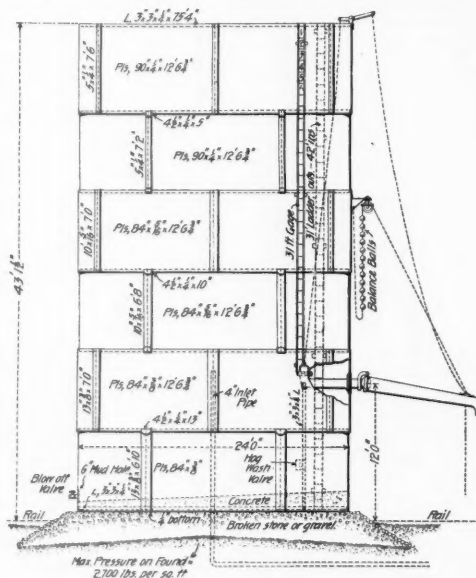
The new suspension bridge recently built for the Lewiston Connecting Bridge Co. and the Queenston Heights Bridge Co., will be formally opened Friday, July 21, the ceremonies at the bridge taking place at 12.30 noon, to be followed by luncheon at Brock's Monument at 1.30.

##### A Third Bridge for St. Louis.

Major W. L. Marshall, Major W. H. Bixby, and Capt. Edward Burr, Corps of Engineers, U. S. Army, have been appointed a Board to inquire into the project of a third bridge across the Mississippi River at

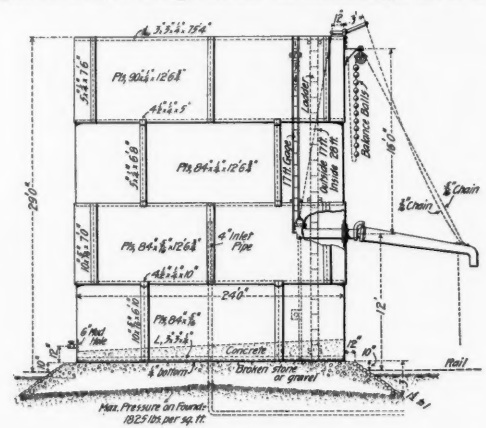


60-ft. Tank.



43-ft. Tank.

Standard Steel Water Tanks of the Atchison, Topeka & Santa Fe.



29-ft. Tank.

station having a short ladder with which to reach the bottom of the fixed ladder.

The small tank has a total capacity of 96,000 gals. of water, the next larger 144,000 gals., and the largest 202,000 gals. of water; the corresponding capacities of the three tanks, above the outlet, are 57,680, 105,580 and 163,840 gals., respectively. The weights of the material in the three tanks, when built according to the drawings shown, are approximately 34,000, 54,000 and 82,000 lbs. The weights of the two smaller sizes may vary somewhat, as where there is any probability that in the future the tank will be extended to provide a greater capacity the plates are made the same thickness as the lower sections of the larger tanks.

The 29 ft. tank contains about the same amount of water as the wooden tank of the Santa Fe, and is

models and granite carvings for the U. S. Court House, Custom House and Post Office buildings at Omaha, Neb.

Proposals are wanted until 12 M., Aug. 8, for repairing the breakwater at Burlington, Vt.; removing rock and dredging in Otter Creek, Vt., and dredging at Narrows of Lake Champlain, New York and Vermont. J. W. Barlow, Colonel of Engineers, U. S. A., Army Building, New York.

Proposals for improving the canal at Cascades, Columbia River, Ore., are wanted until noon of Sept. 1, at the U. S. Engineer's office, Portland, Ore. Address Wm. W. Horts, Capt. of Engineers.

Proposals for dredging in Alviso Harbor, Cal., will be received at the U. S. Engineer's office, Flood Building, San Francisco, Cal., until 12 o'clock, noon, Aug. 10. W. H. Heuer, Major of Engineers.

St. Louis and to make recommendations to the War Department. The last Congress authorized the construction of a third bridge, but stipulated that the charge for its use should not exceed 60 per cent. of that made by the railroads for the use of the present bridges, which is 25 cents for each passenger. This would make the charge by the new bridge 15 cents. The proposition was to build the third bridge with a span of 500 ft. over the ship channel, the estimated cost being \$3,000,000. One Board reported that a span of 700 ft. would be necessary and the report was approved by Secretary Alger. This decision has been protested against by some of the St. Louis Congressmen, who claim that a 700 ft. span is prohibitive as it would increase the cost to \$5,000,000, and that a 500 ft. span is wide enough. Secretary Alger has therefore appointed a second Board as above.



**International Association for Testing Materials.**  
Committee No. 5 of the American Section of the International Association, appointed for the purpose of collecting data concerning tests of all finished material furnished in large quantities to railroads, engineers and manufacturing plants, has sent out a circular in which is given the following classification of the articles regarding which information is desired from those who have made reliable tests. Address replies to the Chairman of the committee, Mr. W. H. Wickhorst, Engineer of Tests, C., B. & Q. RR., Aurora, Ill.

(a) Article tested.  
(b) Apparatus and machines used in making tests.  
(c) Method of making tests.  
(d) Results obtained.  
(e) Methods and results of calibrating apparatus and machines.  
(f) Specifications.  
Cast Iron: Pipes, car wheels, valves, fittings, miscellaneous castings.  
Wrought Iron: (a) Forged—Chain, axles.  
(b) Rolled—Merchant iron, pipe, boiler tubes.  
Low Steel: (a) Cast—castings.  
(b) Rolled—boiler plate, firebox plate, shapes.  
(c) Forged—Axles, piston rods, chain.  
High Steel: Rails, rifles, guns, saws, spades.  
Tool & Spring Steel: Carriage and car springs, locomotive springs, edge tools, axes.  
Copper: Sheet copper, tubes, ferrules, furnace plates, wire.  
Brass and Bronze: Castings, wire.  
Aluminum.  
Glass: Bottles, lamp chimneys, plate glass, lenses.  
Tile, brick, sewer pipe.  
Cement and bond materials.  
Textile fabrics: Cloths, bunting, twine, thread, rope.  
Leather: Belting, gaskets.  
Rubber: Hose pipe, belting.  
Paper, wood, lumber.

#### A Potomac Bridge.

A proposition is on foot for building a memorial bridge across the Potomac River at Washington from the grounds of the Naval Observatory to the Arlington Estate. Four engineers have been asked to prepare designs and plans. These are Messrs. L. L. Buck, Chief Engineer of the New East River Bridge; Prof. W. H. Burr, of Columbia University; George S. Morison and W. R. Hutton.

#### The Westinghouse Air Brake in Russia.

Probably most of our readers remember that a number of months ago the Westinghouse Air Brake Co. began building works in St. Petersburg. These works are finished and in operation, and the despatches announcing a contract made by the Westinghouse people with the Russian Government merely record the development of what has been going on for a good while. An Imperial Commission some time ago made careful tests of various power brakes and decided that the Westinghouse test met their requirements and the order now made is simply carrying further what has been going on in this investigation and in building the works. The Westinghouse Company has the contract to supply all of the brakes that will be required for the next four years for the Government railroads. This covers passenger equipment and freight equipment; the latter will naturally be much the largest part of the business. The latest edition of the Statesman's Year Book gives the Russian railroad system up to Sept. 1, 1898, as follows: Open for traffic, 27,644 miles; of this under the Ministry of Ways and Communication, 24,591 miles; miles worked by the State, 16,453; by private companies, 8,138. The Ministry of War works the Transcasian line, 1,027 miles, and there are 1,566 miles in Finland. The miles building at that date are reported as 7,426, of which 1,054 was by the State, 2,636 by the Siberian Railroad Administration and 3,727 by private companies. It will be seen that the railroads directly operated by the State amount to a very large percentage of the whole, as we must include the Siberian road. Furthermore, it seems probable that the requirements of the Government will dictate the use of the Westinghouse brake on private lines, although trials will be permitted of brakes of other kinds.

#### THE SCRAP HEAP.

##### Notes.

The Postal Telegraph Cable Co. has filed articles with the Secretary of State of Wyoming declaring its intention to build a telegraph line from Denver to Salt Lake along the line of the Union Pacific.

A press despatch says that the Lake Shore & Michigan Southern has abandoned the requirement, first prescribed about 18 months since, that engineers and firemen of locomotives shall wear uniforms.

The Milwaukee Journal says that laborers on new railroad construction in the Northwest are now being paid \$2 a day, the highest rate that has prevailed in that region since 1888. The demand is still heavy in Northern Wisconsin, Michigan, Minnesota, Iowa and Washington.

In Columbus, O., on Sunday, July 9, William Reinhard, his wife and four children were killed at a railroad crossing, and a fifth child was badly injured. The family were driving across the track of the Cleveland, Cincinnati, Chicago & St. Louis at Woodward avenue.

Passenger train No. 1 of the Colorado & Southern was stopped by robbers near Folsom, N. M., on the

night of July 11 and the express car was blown open with dynamite. It is said that little booty was secured. The sheriff, who pursued the robbers, overtook them near Cimarron on July 16, and a fight ensued in which one of the sheriff's men was killed and two others were wounded. One of the robbers was killed.

It was announced in Detroit on July 14 that the street railroads would at once introduce three-cent fares, tickets at the rate of five for 15 cents being advertised on all the cars. The next day a press dispatch announced that Messrs. Johnson and Pingree had failed to consummate their scheme for the consolidation of all the street railroad lines of the city, which throws some doubt on the three-cent-fare news item. Indeed, it is said that the three-cent tickets bear a time limit clause under which the company can withdraw them at any time.

#### The Brooklyn Street Railroad Strike.

Early Sunday morning of this week many of the motormen and conductors on the lines worked by the Brooklyn Rapid Transit Co. went out on a strike. About four-fifths of the men of the Nassau lines and one-fifth of the men on other lines worked by the company joined in the strike, but at this writing the movement appears to have been a complete failure. The real dissatisfaction, so far as any existed, appears to have been on the Nassau lines, which were leased a few months ago. The labor organizations of the employees complained that men were being discharged without reasonable cause and that the rate of wages was lower than before the Nassau lines were turned over to the Brooklyn Rapid Transit Co., but there seems to be ground for the reports that stock jobbing interests had something to do with instigating the strike.

On Sunday the travel was comparatively light, so that enough cars were kept running to handle practically all of the passengers. On Sunday and Monday nights, however, cars were taken off except on a few of the main lines. On Monday and Tuesday a fairly regular service was maintained, and by Wednesday morning it appeared that the worst of the strike was over and some of the men were being taken back. There has been considerable violence during the strike. At some places, notably on the Nassau lines, cars have been blockaded and motormen and conductors have been maltreated. In some places the effective work of the police alone prevented serious outbreaks. On Wednesday morning about one o'clock two dynamite explosions damaged temporarily the elevated structure, the cause of the explosion being attributed to the strikers. On the elevated roads controlled by the Brooklyn Rapid Transit Company the men remained steadily at work.

#### Moving a Court-House On Cars.

The Burlington & Missouri River Railroad has transported a court-house 20 miles; and those railroads which have been boasting of how they carried such little things as chunks of granite or marble will have to take a "back seat." This court-house is 40 ft. x 50 ft. and two stories high. We get the details from a report, dated July 1, in the Lincoln (Neb.) Journal, as follows:

The county seat of Box Butte County has been removed from Hemingford to Alliance. . . . The court-house was safely hauled from Hemingford to Alliance. It is 50 ft. long by 40 ft. wide, two full stories in height, with a heavy truss roof, and has a heavy hard pine frame. As there were two cuts to pass through, the building was raised on timbers high enough to clear the banks and when ready to start it was 50 ft. from the track to the top of the deck on the building. The weight of the building is estimated at 100 tons. It was hauled on four 50,000-lb. capacity trucks. The building was moved at the rate of six miles an hour. Six hours after leaving Hemingford the building was clear of the track at Alliance. One chord of a truss was made of three 6 x 16—32 ft. stringers over each truck. One 6 x 16—38 ft. was used as a sand board to hold truss together. The building was held in position from swaying by a set of double block and falls over each corner and brought down to the opposite side of a 60,000-lb. capacity coal car loaded with coal. The work was all done under the direction of E. W. Bell, formerly Superintendent of the Nebraska Planing Mill at Lincoln.

#### Liquefied Hydrogen.

Professor Dewar, while lecturing at the Royal Institute, London, on June 7, introduced "a new agent in chemical research" in the form of liquid hydrogen. After explaining that liquid hydrogen was costly, excessively volatile and had to be preserved with great care, he pointed out that there must always be something that would enable them to preserve it as much as possible from radiation. Therefore, in his experiments, he would surround it with liquid air. The reflection of a tube of liquid hydrogen was then thrown on the screen, the lecturer drawing attention to the surrounding air solidifying as snow. In another experiment, a piece of cork sank to the bottom of the liquid hydrogen. Next, proof was afforded that the newly discovered liquid has not magnetic properties. The temperature at boiling point is 21° absolute or 252° below freezing point.

#### Chicago Drainage Canal.

As the permit of the Secretary of War for the opening of the canal expires when Congress meets, and it is feared that extended controversy will follow in Congress unless the canal is opened before Congress convenes, every effort is being made by the Trustees of the Sanitary District to hasten the work on the canal and insure its completion and opening before Dec. 1. The Board of Trustees on July 12 agreed to pay contractors for the substructure of the Campbell avenue bridge \$120,000 additional compensation for extra labor and material, and to pay the contractors for the By-pass from Adams to Van Buren St., Chicago, \$38,302 extra, making a total for extras of \$158,302. The Board also agreed to the transfer to McArthur Bros. of the Scherzer contract for the superstructure, in order to expedite the work.

Under a temporary agreement between the Trustees of the Sanitary District and the contractors for Section 18, Gahan & Byrne, whose work is behind, the work will at once be resumed and pushed as rapidly as possible, the question of about \$30,000 for extras raised by the contractors to be settled later.

Work will be continued day and night on all unfinished parts of the work.

The City Council of St. Louis on recommendation of its special committee of investigation of the effects of the canal on the water supply of St. Louis, instructed the City Counselor to take "such legal steps as may be necessary to enforce the rights and protect the interests of the City of St. Louis."

In the work of inspecting the canal by the Illinois State Commission J. P. Frizell of Boston and Irving Watson of Chicago have been appointed principal assistants to Mr. Desmond Fitzgerald, Chief Engineer of that Commission.

#### Air Brakes for Street Cars.

On the Twin City Electric Ry. (the Interurban line between St. Paul and Stillwater, Minn.) the new street cars will be equipped with compressed air brakes and whistles to be supplied with power by a small motor operating an air pump. Each car will also have a telephone with 50 ft. of wire and a switch plug, and at intervals of one-fourth of a mile places will be provided where the conductor can cut in on the telephone wire between St. Paul and Stillwater and communicate with the power house or car barn. This road will build 10 motor and 10 trail cars at its own shops.

#### Freight by Electric Road.

Reports from Detroit say that the freight traffic of the Detroit, Ypsilanti & Ann Arbor electric railroad is increasing and promises to become a profitable part of the business of that road. Two shipments a day are made from the Detroit depot and two shipments a day are received there. Ann Arbor takes about half the freight, which consists of vegetables and groceries, and trunks and other articles usually carried by express.

#### Chicago Elevated Roads.

During the first six months of 1899 the Metropolitan Elevated carried 2,200,000 more passengers than in the same period last year, the gain for the six months being about 19 per cent. The average daily traffic for May was 73,000, a gain of 22 per cent. as compared with May, 1898. The June traffic this year showed a drop of only 4 per cent. as compared with May, against 7 per cent. last year.

The South Side Elevated the first six months of this year, compared with 1898, shows a gain of 17½ per cent. in gross traffic earnings. Compared with the first six months of 1898 the gain is 78 per cent. So far this year each month has showed a larger gain than the preceding one.

#### Way Bills by Typewriter.

Book typewriters have now been used for making waybills in the freight office of the Chicago, Burlington & Quincy at Chicago for about one year, and seven machines are now in use there. It was several months before the clerks were able to make as good time on the machines as with the pen, but it is said that the experiment is now a success. The best record thus far made was the billing of 510 shipments in 9 hours 30 minutes.

#### Electric Suburban Service in Chicago.

An agreement has been made between the Chicago, Milwaukee & St. Paul and the Chicago & Milwaukee Electric Ry., by which the electric road will use the steam railroad's tracks from Evanston to Chicago, a distance of about five miles. The electric road has also made a connection at Wilson Ave., the terminus of the new Northwestern Elevated, for running trains into the heart of Chicago. The electric line is about completed, and will soon be running from Waukegan to Evanston, a distance of 30 miles. The new connection will make it possible to run trains from Waukegan to Chicago, 40 miles. It will also establish a line from Milwaukee, Wis., 85 miles north. The C. & M. opened the section of its line between Evanston and Kenilworth on July 16 with a regular schedule of cars every 25 minutes. The cars used were the 50-ft. combination passenger and baggage cars, and bicycles are carried free.

#### Compressed Air Cars.

On the North Clark Street Ry. the night service has been increased and the two compressed air cars previously noted now carry one or two trailers each. The service is to be still further increased by running cars every 15 minutes instead of every 20 minutes as at present.

#### LOCOMOTIVE BUILDING.

The Cooke Locomotive Works are building five engines for the Southern Pacific.

The Baldwin Locomotive Works are building 23 locomotives for the Lehigh Valley.

The National Steel Company is having two engines built by the Cooke Locomotive Works.

The Pittsburgh Locomotive Works are building five locomotives for the Chicago & Eastern Illinois.

The Nevada, Colorado & Oregon is having two locomotives built by the Baldwin Locomotive Works.

The Pittsburgh Locomotive Works are building five engines for the Kansas City, Ft. Scott & Memphis.

The Baldwin Locomotive Works have received an order from the Copper Range for two switching locomotives.

The Baldwin Locomotive Works have received an order from the State Railways of Finland for 13 consolidation locomotives.

We are officially informed that the Baldwin Locomotive Works have not received an order for locomotives from the Pecos Valley & Northeastern.

We are officially informed that the Baldwin Locomotive Works have not received an order for switching engines from the Atchison, Topeka & Santa Fe as has been reported.

The Fitchburg has placed an order with the Schenectady Locomotive Works for four 12-wheel compound engines to weigh 162,400 lbs., with 128,000 lbs. on drivers. The cylinders will be 22 x 34 x 38 in.; diameter of drivers, 54 in.; tank capacity for water, 4,500 gals.

The Mexican Central has ordered five locomotives from the Rogers Locomotive Co., to be the same as the last lot ordered from the Baldwin Locomotive Works and the Rogers Locomotive Co. They will have 160,000 lbs. on drivers, with a total weight of



180,000 lbs. in working order; the tenders will be of 4,500 gals. capacity.

The Imperial Government Railways of Japan, and a large New York exporting house, have recently placed orders for seven Baldwin-Westhouse Electric Locomotives, for use in the Government and other mines in Japan. These engines are the joint manufacture of the Baldwin Locomotive Works and of the Westhouse Electric & Manufacturing Company.

The 11 locomotives ordered by the Lake Shore & Michigan Southern from the Brooks Locomotive Works, as noted in our issue of June 30, will be 10-wheel fast passenger engines with cylinders 20 in. in diameter by 28 in. stroke, and driving wheels 80 in. in diameter. The engines will weigh about 166,000 lbs., of which about 125,000 lbs. will be on the drivers. The boilers will be of the radial stay type and will carry 200 lbs. pressure. The tank capacity for water will be 5,000 gals., and coal capacity 11 tons. We also understand that cast steel parts will be largely used.

In our issue of last week we noted that the Erie had placed an order with the Brooks Locomotive Works for 20 locomotives. These will be simple consolidation engines for December and January delivery, and will weigh 170,000 lbs., with 150,000 lbs. on the drivers. The cylinders will be 21 in. x 28 in.; the drivers will have 50 in. centers and 3½ in. tires, the diameter being 57 in. over tread. They will have Wootten boilers, with a working steam pressure of 200 lbs., containing 304 iron tubes, 13 ft. 3½ in. long and an outside diameter of 2 in.; the fireboxes will be of carbon steel, 114 in. long and 96 in. wide; tank capacity for water will be 6,000 gals. and for coal 12 tons. They will have Westhouse-American air brakes, steel axles, Gollmar bell ringers, Gould couplers, 23 in. headlights, Metropolitan injectors, U. S. piston rod and valve packings, Consolidated safety valves, Leach sanding devices, Detroit lubricators, French springs, Ashcroft steam gages, Paige truck wheels, chilled tender wheels and steel wheel centers.

#### CAR BUILDING.

The Chicago & Alton is getting bids on from 100 to 200 furniture cars.

We are informed that the Fitchburg will build 200 cars at its own shops.

The Vinton Colliery Co. has ordered two cars from the Middletown Car Works.

The Flint & Pere Marquette is getting bids on 400 coal cars of 80,000 lbs. capacity.

The Mexican Central has placed an order with the Allison Mfg. Co. for 30 four-wheel cabooses.

It is officially denied that the Delaware, Lackawanna & Western will order coal cars, as reported last week.

We are officially informed that the Wisconsin Central has not recently ordered any new passenger equipment.

The American Car & Foundry Co. is building at St. Louis 100 refrigerator cars for the St. Louis Refrigerator Car Co.

The Swift Refrigerator Line has ordered 250 refrigerator cars from the Wells & French Co. for October delivery.

We are informed that the Atchison, Topeka & Santa Fe will build 350 cars more, of different kinds, at its Topeka shops.

We are informed, but not officially, that the Pressed Steel Car Co. is building 25 steel cars for the Monongahela Connecting Ry.

The 10 coaches which the Chicago, St. Paul, Minneapolis & Omaha ordered on June 20 from Pullman's Palace Car Co. are for Oct. 15 delivery.

We are informed that the Chicago & Alton is getting bids from Barney & Smith and Pullman's Palace Car Co. on cars for two limited passenger trains.

The Cincinnati, Hamilton & Dayton has ordered 300 coal cars from the Barney & Smith Car Co. They will be 36 ft. long and have a capacity of 60,000 lbs.

It is understood that the 300 coal and box cars for which the Indiana, Illinois & Iowa received bids some months ago, as noted at the time, will be ordered within a week.

We understand that the Colorado & Southern has ordered 90 steel cars from the American Car & Foundry Co., to be built at the Madison Works, St. Louis, of rolled shapes.

The Chicago, Milwaukee & St. Paul will build at its West Milwaukee shops 1,500 box cars, 250 coal cars and 250 flat cars, work to begin in September and cars to be turned out at the rate of 10 to 15 a day.

The 500 80,000-lb. box cars ordered by the Illinois Central from the American Car & Foundry Co. on July 7, as noted in our issue of last week, are for August and September delivery. They will be 40 ft. long inside, 8 ft. 6 in. wide inside and 7 ft. 4¼ in. high, and will weigh 37,000 lbs. They will be equipped with Monarch brake-beams, plain cast iron brake shoes, Westhouse air brakes, Chicago couplers, Thornburg draft rigging, malleable iron journal boxes with Fletcher pressed steel lids, Prince's mineral paint, Chicago metal roofs, open-hearth steel truck springs and crucible steel draft springs, cast iron wheels, M. C. B. brasses, roller doors made by the car company with Illinois Central malleable iron door fastenings and arch bar trucks with metal bolsters. The make of bolsters and whether iron or steel axles will be used are not yet settled.

#### BRIDGE BUILDING.

ADAMS, MASS.—A bridge will be built, according to report, across the Hoosac River opposite the Boston & Albany railroad crossing near Albert St. John H. Emigh, Commissioner of Public Works.

ATLANTIC CITY, N. J.—The County Board of Freeholders has ordered a bridge built over the Pleasant Mills stream near Hammonton.

AUSTIN, TEX.—An International & Great North-

ern bridge across a deep gulch south of the city was destroyed by fire July 11. It cost \$15,000.

BARKER, ILL.—The Owego Bridge Co. has the contract at \$9,600 for the two-span Pratt truss bridge across the Chenango River at Chenango Forks. (July 7, p. 496.)

BATTLE CREEK, MICH.—The Council has voted to build a new stone bridge at South Jefferson St.

BELLEVUE (ALLEGHENY), PA.—The County Commissioners, according to report, have decided to build a bridge across a ravine between Bellevue and Avalon.

BEMENT, ILL.—The bids received July 10 for the highway bridge have been rejected and other bids are wanted by July 22. Address Harvey Fay, Town Clerk. (June 30, p. 479.)

BERLIN, ONT.—The contract for the foundations for the iron highway bridge at New Hamburg has been let to Rowan & Elliot of St. Catharines for Longford stone, at \$7.80 per cu. yd. (July 7, p. 496.)

BOWMANSDALE, PA.—The Commissioners of York and Cumberland counties will build a bridge across the Yellow Breeches Creek, about two miles east of Bowman'sdale, according to report.

BRYAN, TEX.—Brazoria County proposes to issue \$25,000 in bonds for new bridges.

BUENA VISTA, ORE.—Reports state that the people of this place are endeavoring to have a wagon road built to Albany, Ore., which will require a bridge across the Luckiamute.

BUTTE, MONT.—The Great Northern, reports state, will build three bridges to replace wooden structures in the western part of Montana. One is over Two Medicine Creek. It will be 1,100 ft. long and will be 125 ft. above the stream.

CAMBRIDGE, MD.—The Commissioners of Dorchester County, according to report, will build a drawbridge across the Nanticoke River. The last Legislature authorized the issuance of \$3,000 bonds to pay for it.

CAMDEN, N. J.—The Groton Bridge Co. has the contract for the 40 ft. steel bridge over Penshankin Creek. (July 14, p. 512.)

CHARLESTON, TENN.—The Converse Bridge Co. has the contract for the steel span and for the stone piers for the bridge across Mouse Creek, for which bids were received July 1 by H. H. Knox, Chairman of County Commissioners. There were five other bids.

CHELSEA, WASH.—Messrs. Field & Graham have a contract at \$1,350 for several bridges on the tributaries to Bridge Creek.

CHICAGO, ILL.—On July 11 City Engineer Ericson, of Chicago, notified the Chicago, Burlington & Quincy and the Chicago & Northwestern that work on the viaducts along Sixteenth St. at Throop, Center and Halsted Sts., which they last week agreed to repair, must be rushed. This notice also includes the work on the new viaduct at Canal St., mentioned in our recent issues. As the condition of these viaducts is dangerous, the city wants the work completed at once.

Address W. L. Marshall, Major of Engineers, U. S. A., regarding proposals for steel and cast iron for the Aqueduct Bridges Nos. 1, 2 and 3 on the Illinois and Mississippi Canal, which are wanted at 12 o'clock noon (central time) Aug. 9.

COPENHAGEN, DENMARK.—The Danish Government, according to report, wants bids for the supply, delivery and building of the superstructure of two viaducts near Copenhagen. Address Reventloosgade, 10, Copenhagen, Chief Engineer of the State Railroads.

COPPOCK, IA.—The counties of Henry, Washington and Jefferson will build a bridge across the Skunk River at this place, on the boundary line of the three counties.

COUNCIL GROVE, KAN.—The County Commissioners will receive bids until Aug. 14 for an iron bridge 75 ft. long, and estimated to cost \$1,200, over Laird's Creek. F. H. Hannah, County Surveyor.

DENVER, COLO.—A viaduct, according to report, will be built over the railroad tracks at Nineteenth street.

DES MOINES, IA.—The bridge which the City Council has requested that bids be asked for is for either a steel or Melan arch bridge across the Des Moines River at Sixth Ave. (May 26, p. 377.)

DULUTH, MINN.—Plans for the new steel bridge over Coffee Creek on the Boulevard are finished, and bids are wanted until Aug. 10.

ELKTON, MD.—The Cecil County Commissioners want bids Aug. 1 for the bridges over Bullfrog Run, on the road leading from Elkton to Chesapeake City, at Principio Furnace over Principio Creek, and at Liberty Grove over Basin Run. Plans and specifications on file at Commissioners' office in Elkton. John Banks, Assistant Treasurer, Elkton, Md. (July 14, p. 512.)

ELWOOD, IND.—The County Commissioners have inspected sites for a couple of new bridges over Duck Creek near this place.

GOLDENDALE, WASH.—Bids are wanted Aug. 8, by the County Commissioners for building a bridge across the creek known as the outlet to Camas Lake.

HAVANA, ILL.—The C., B. & Q., according to report, will build a steel bridge to replace an old structure over the Spoon River southwest of Lewis-ton.

HAZELTON, PA.—The ordinance authorizing the Lehigh Valley RR. to build an overhead bridge on Vine St., between Alden and Hawthorne Sts., has been advanced to a third reading in the City Council.

HUME, ILL.—The Highway Commissioners will receive bids for a 22-ft. steel bridge to be built over Spring Slough.

INDIANAPOLIS, IND.—The County Auditor has been instructed to receive bids for building the proposed bridge over Fall Creek at Central Ave. Estimates are wanted on three different styles of bridges.

The Park Board received two bids for the two suspension bridges over the river in Riverside Park.

They were from J. D. Adams & Co., for \$8,960, and the Wabash Bridge & Iron Co., for \$8,000. The contract was to be let July 14.

E. M. Johnson, City Controller, says that if the ordinance authorizing the issuance of \$150,000 bridge bonds is passed at an early date, bids will be wanted for them until Aug. 22.

IOWA CITY, IA.—Soundings are being made for the proposed 300 ft. bridge to be located at Holland's ferry. The work is estimated between \$5,000 and \$7,000. (June 9, p. 415.)

Bids are asked until July 24 for the proposed steel trestle 165 ft. long on Dodge St. H. H. Jones, City Clerk.

JERSEY CITY, N. J.—Reports state that the North Jersey St. Ry. Co. will build a new bridge across the Newark & New York railroad cut at Jackson Ave. for its Jackson Ave. line.

KANKAKEE, ILL.—Plans are said to be in contemplation for the proposed bridge at Washington Ave. It will probably be a stone structure. (Feb. 3, p. 90.)

LINCOLN, ILL.—The Indiana Bridge Co. has the contract for bridges for Logan County as follows: Two in Atlantic Township, one 60 ft. long and the other 50 ft., the total cost of which is \$2,379; one over Salt Creek, near New Holland, of 170 ft., with 14 ft. roadway, at \$6,469.

McMINNVILLE, ORE.—The following bids were received for building the bridge across the Yamhill: Pacific Bridge Co., combination span with wooden piers, \$2,650; with concrete piers, \$4,250; steel span, \$6,250. W. H. Morris, \$2,198 for a Howe truss with wooden piers.

MILWAUKEE, WIS.—The Board of Public Works is receiving bids until July 21 for the steel joists for East Water St. bridge in Milwaukee. Chas. J. Poetsch, Chairman.

MONTESANO, WASH.—The County Commissioners received the following bids for building the three bridges on the John Richardson road: Savage & Schofield, Olympia, superstructure \$1,340, piles in approaches 11½ cents per lineal ft., lumber in approaches \$11.85 per M.; Robert Gold, superstructure \$1,350, piles in approaches 15 cents per lineal ft., lumber \$13 per M.; James Foxall & Co., Hoquiam, trusses \$1,362, lumber \$11.44, piling 11½ cents; Puget Sound Dredging Co., Seattle, trusses \$1,770.64, piling 20 cents, lumber \$14; Mourant & Briscoe, Hoquiam, spans or trusses \$1,097, piles 11½ cents, lumber \$2.13½ per lineal ft.; Northwest Bridge Co., Tacoma, trusses \$1,410, piles 15 cents, lumber \$10.50. (June 23, p. 459.)

NEW BRUNSWICK, N. J.—The County Freeholders will build several small bridges and make repairs to others.

NEWPORT NEWS, VA.—The King Bridge Co. has had the time extended to Sept. 15 for building the 34th and 35th St. bridges.

NEW WHATCOM, WASH.—F. B. Chandler has the contract for building the frame trestle bridge 160 ft. long, across the gulch on road No. 153. (Apr. 21, p. 287.)

NEW YORK, N. Y.—The Board of Estimate and Apportionment has authorized the issue of \$4,000,000 in bonds for the completion of the new East River Bridge. Of this sum \$2,750,000 is for the cables, wrapping and suspenders and for the approaches, and \$1,250,000 to pay the awards for land condemned on both sides of the river, as that land is needed.

NORRISTOWN, PA.—The contract for the Airy St. bridge over Saw Mill Run has been awarded to the Pittsburgh Bridge Co. at \$22,000. The other bidders were: Penn Bridge Co., \$23,991; New Jersey Steel & Iron Co., \$23,615; Phoenix Bridge Co., \$23,595; Canton Bridge Co., \$23,890; Groton Bridge Co., \$23,590; Youngstown Bridge Co., \$24,111; Massillon Bridge Co., \$24,650; Variety Bridge Co., \$24,000; Toledo Bridge Co., \$23,900; Wrought Iron Bridge Co., \$25,800; Pottstown Bridge Works, \$23,560; King Bridge Co., \$25,250. (April 28, p. 303; June 9, p. 415.)

NORTHAMPTON, MASS.—The Highway Committee is considering a new bridge across the Mill River, connecting Smith and Pleasant Sts., which will require a span of 100 ft.

OAKLAND, CAL.—W. H. Heuer, Major of Engineers in charge of the improvement in Oakland Harbor, will receive proposals until Aug. 9 for a steel highway draw span and piers, also for approaches thereto, across the tidal canal at Oakland Harbor.

OTTAWA, ONT.—Charles McNab, Clerk, will receive bids on behalf of Carleton County Council for the proposed iron bridge (or steel) over the River Jack, six miles from Stittsville station; bridge to be 100 ft. long, with 16 ft. clear roadway. Plans at County Clerk's office, this city.

OTTO, WYO.—Plans are being considered for a bridge across the Grey Bull River, which will probably cost \$2,000.

PITTSBURGH, PA.—The Wilkes-Barre & Wyoming Valley Traction Co. will, according to report, replace the wooden bridge over the Susquehanna River at Pittston with an iron structure.

PORTLAND, ORE.—Reports state that a new structure will probably replace the Madison St. bridge, which has been declared unsafe.

A Pratt combination truss, with a swing span of steel, has been recommended for the new Madison street bridge.

PRESTON, ONT.—The Council will spend \$4,500 on bridges, according to report.

PULASKI CITY, VA.—The bridge which is projected across the New River is estimated to cost \$15,000. A location has been decided upon. (July 7, p. 479.)

QUINCY, CAL.—D. M. De Long, Manager of a mining company on the North Fork of Feather River, appeared before the Board of Supervisors, recently, in the interests of a suspension bridge at the Beatty Place, across the North Fork.

RANDOLPH, UTAH.—It is understood that a bridge will soon be built across Bear River, to connect Randolph with Sage on the Oregon Short Line. The Legislature appropriated \$2,000 toward the bridge. (Apr. 7, p. 251; June 2, p. 392.)

RANKIN, PA.—The Monongahela Traction Co., according to report, has a project for an overhead



bridge in Rankin Borough, over the tracks of the United Traction Co.

**REDDING, CAL.**—The County Surveyor has plans for the new bridge across the river at Spring Creek. See also "Other Structures."

**ROCHESTER, N. Y.**—Receiver H. F. Atwood of the Rochester & Irondequoit R.R. has asked permission to issue certificates to build two new bridges over the tracks of the Rome, Watertown & Ogdensburg.

**ROSEBURG, ORE.**—Bids will be received by the Court of Douglas County, until 1 P. M., Sept. 6, for a bridge across Looking Glass Creek at Brookway, and one across Elk Creek, at Drain, both bridges to be covered, bidders to furnish plans and specifications. Joe Lyons, County Judge.

**ST. LOUIS, MO.**—The Secretary of War has appointed Major Wm. L. Marshall, Wm. H. Bixby and Captain Edward Burr, of the Corps of Engineers, U. S. A., a board to examine and report upon the proposed third bridge across the Mississippi River at St. Louis, which is further described under "Technical."

**SAN JOSE, CAL.**—The following bids were received by the Board of Supervisors July 3, for a 500 ft. bridge over Los Gatos Creek at Campbell Ave. The plans called for bids on three styles of bridges: (1) J. Crapo, Plan 1, \$3,230.70; (2) \$3,330.70. John Doyle, (1) \$3,247; (2) \$3,317; (3) \$3,874. J. Richers & Son, (1) \$3,300; (2) \$3,450; (3) \$3,943. M. P. Madison, (1) \$4,600; (2) \$4,800; (3) \$5,000. Chas. Wehner, (1) \$3,548; (2) \$3,631; (3) \$4,109. Bids all rejected. (June 23, p. 459.)

Plans are being made for the new bridge across the Coyote Creek at 14th and Julian Sts. (July 7, p. 497.)

The bids for the bridge across San Antonio Creek on the San Francisco road were returned unopened. A call for bids will be re-issued as soon as a Superintendent of the District is appointed.

**SANTA ROSA, CAL.**—Reports state that forest fires destroyed three wooden bridges in the northern part of Sonoma County.

**SAULT STE. MARIE, MICH.**—Bids will probably be wanted soon for five or six new bridges having 24 ft. roadways and spans of 250 ft. each. Address James A. Lawrie, City Engineer.

**SAXON, N. C.**—The Clerk of Stokes County, Saxon, wants bids on two steel bridges about 200 ft. long, to be completed by Nov. 1.

**SCRANTON, PA.**—The Scranton Ry., according to report, will build a steel bridge over the Lackawanna River, 1,002 ft. long, from Mulberry St. and Mifflin Ave. to the car and power house on the Providence Road. Plans have been prepared by the Edgemoor Bridge Co. which require four spans, two of 128 ft., one of 98 ft. and another of 208 ft. long, respectively, and a steel trestle 440 ft. long for approach. There will be a bend in the structure 20 ft. wide. The bridge will have double tracks and will have a 5% grade.

**SHARPSVILLE, PA.**—The bridge over the Erie & Pittsburgh and the Sharpsville railroads has been condemned by the Council.

**SOUTH BEND, IND.**—Surveys are being made for the proposed new bridge across the St. Joseph River at Sample St. It will be about 378 ft. long and of three spans. This bridge has been under consideration for about a year, and there is still another large bridge in contemplation in South Bend.

**STRATFORD, ONT.**—W. F. Van Buskirk, City Engineer, has been instructed to ask for bids for iron bridge between Stratford and Easthope. He estimates the cost of the proposed bridge on St. John St. at \$3,700. Debentures to provide funds will probably be issued.

**SUNBURY, PA.**—The Groton Bridge & Mfg. Co. has subscribed \$10,000 for stock in the company to be formed to build a projected bridge over the Susquehanna River at this point. (June 2, p. 392.)

**THURSO, QUE.**—The Township Council of Lochler has decided to build a number of bridges.

**VALLEJO, CAL.**—The County Supervisors have ordered that a bridge be built across Sweeney Creek, in Vacaville Township.

**WALLA WALLA, WASH.**—The Council has accepted the bid of the Pacific Bridge Co. to build the bridge across Mill Creek on Fourth Street. The bid was \$2,585. (June 2, p. 392.)

**WASHINGTON, D. C.**—It has been decided to limit the competition for designs and plans for the proposed memorial bridge across the Potomac River to Arlington Cemetery to four prominent bridge engineers, instead of inviting plans and designs from fifteen engineers, as was originally announced, on account of the great cost involved in the preparation of plans for a structure of such an elaborate character, estimated at not less than \$1,000 each. Under the new arrangement the competing engineers will be paid for their services in the order of merit as follows: First \$1,200, second \$1,100, third \$1,000 and fourth \$900, making a total of \$4,200, and leaving a balance of \$800 for other necessary expenses in connection with preparing the plans and report for submission to Congress. (June 23, p. 459.)

The men selected to make competing plans for the new bridge are George S. Morrison, Leffert L. Buck, William H. Burr and Wm. R. Hutton, all of New York City.

**WATSONVILLE, CAL.**—G. N. Simmons has the contract for the bridge across Corralitos Creek, for which proposals were received July 3. The following bids were received: Darby Laydon, \$2,597; California Bridge Co., \$3,439; N. Mosher, \$2,750; Cotton Bros., \$2,700; G. N. Simmons, \$2,185. (June 30, p. 480.)

**WEST SPRINGFIELD, MASS.**—The Pittsburgh Bridge Co. has the contract at \$18,130 for the bridge over the Agawam River between West Springfield and Agawam.

**WILMINGTON, N. C.**—The Atlantic Coast Line will require one bridge and one mile of trestle work on its southeastern extension. (Railroad Construction column.)

**WINONA, MINN.**—A steel girder bridge 45 ft. long, with stone abutments, according to report, has been recommended by the City Engineer to replace the Pleasant Valley bridge. A stone arch is proposed on Mankato Ave.

**YOUNGSTOWN, O.**—An iron bridge is said to be under consideration by the County Commissioners for

Beaver Township. Bonds were recently sold by the county for new bridge work.

#### Other Structures.

**ALLEGHENY, PA.**—Work has been begun on the new freight shed on Darragh St., for merchandise and package freight by the Allegheny & Western Railway.

**ANDERSON, IND.**—Reports state that the Union Traction Co. will build a \$275,000 power house in North Anderson.

**BALTIMORE, MD.**—Reports state that plans have been prepared by Jackson C. Gott for a six-story brick, stone and iron warehouse on Jefferson St. near Sharp for J. J. Albert.

**BOSTON, MASS.**—Norcross Bros. have the contract for the ten-story office building and theater on the site of the old Boston Public Library, Boylston St. Estimated cost, \$1,000,000. It will have a framework of steel and the front will be of Milford pink granite.

A ten-story steel frame fire-proof office building at 70 State St. will be built by Reginald Foster, Russell S. Codman and others, estimated to cost \$175,000.

Peabody & Stearns, according to report, have in contemplation a steel-frame fire-proof structure, 34 ft. front.

**BRIDGEPORT, CONN.**—The Berlin Iron Bridge Co. of East Berlin, Conn., is building in Bridgeport for the Armstrong Manufacturing Co. a fire-proof storehouse, the framework of which is of steel and the covering of corrugated iron.

**BRIDGEPORT, O.**—Reports state that the Pittsburgh Structural Iron Co. will build a plant costing about \$125,000, for the manufacture of bridge iron.

**CHESTER, PA.**—Plans are in the hands of contractors for bids on a new rolling mill to be built here.

The Board of Directors of the Tidewater Steel Co., according to report, at a recent meeting decided to make additions to the plant.

**CHICAGO, ILL.**—Plans, according to report, have been made for a Masonic Temple building to be built on Harvard Ave., near 63d St., for the Englewood Masonic Temple Co. Estimated cost, \$35,000. C. W. Mulligan, New York Life Bldg., Chicago, architect.

Reports state that A. H. Connor & Co. of Cedar Rapids, Ia., have the contract for 34 new stations for the Chicago & Northwestern Ry. between Burt, Ia., and Vesta, Minn., and Wall Lake and Denison, Ia.

**CINCINNATI, O.**—Reports state that the Washington-Goodwin Meter Co. will build a plant in Cincinnati, O.

**COLORADO SPRINGS, COL.**—Dr. B. P. Anderson and others, according to report, are about to build a new sanitarium to cost \$100,000. Douglass & Hetherington, architects.

**DUBLIN, TEX.**—The Texas Central R.R. will build new machine shops at Dublin as soon as title is secured to the land selected. The company is already equipped with the necessary tools and will only be in the market for three or four additional ones.

**GALLIPOLIS, O.**—Bids are wanted by July 27 for building an industrial building for females at the Ohio Hospital for Epileptics. H. C. Rutter, Secretary of the Board of Trustees, may be addressed.

**HACKENSACK, N. J.**—The Erie Railroad, according to report, is contemplating a new passenger station at Main St.

**HARRISBURG, PA.**—The following bids were received by the County Commissioners for the new addition to the county jail: Pauly Jail Building Co., St. Louis, \$157,259; Diebold Safe & Lock Co., Canton, Ohio, \$125,000; Dean & Westbrook, New York, \$123,500; the Stewart Co., Cincinnati, \$119,850; Mr. Miller, Pittsburgh, \$108,988; Pittsburgh Bridge Co., \$107,000.

**IOWA CITY, IA.**—The contract for the new court house at Iowa City was awarded to the firm of Rawson & Mohnke of Grand Rapids, Mich., for \$76,500. The jail building was awarded to C. L. Wandt of Burlington, Iowa.

**JACKSON, MISS.**—The city may issue \$15,000 bonds toward a new depot for the Gulf & Ship Island Railroad.

**JEFFERSONVILLE, IND.**—Reports state that Robert S. Sinclair, 143 Liberty St., New York City, is interested in the Alsen Cement Co., which will build branch works in Jeffersonville.

**KOSCIUSKO, MISS.**—Bids are wanted by John M. Fletcher, Secretary and Treasurer, M. & F. Bank Bldg., until July 25 for material, labor, etc., for a new church building.

**KNOXVILLE, TENN.**—Reports state that Frank P. Milburn of Charlotte, N. C., will prepare plans for a new passenger station in Knoxville.

**LOS ANGELES, CAL.**—A special election will be held Aug. 3 to decide whether the city shall issue new bonds, \$200,000 of which it is proposed to use for new public school buildings.

**LYNCHBURG, VA.**—Reports state that the directors of the Glamorgan Pipe & Foundry Co., and the Lynchburg Plow Works are considering improving the plants of both companies to double the capacity of the works. W. J. Franchi, formerly of the Manhattan Ry., New York, is a director in these companies. J. R. McWane is President and General Manager.

**LYNN, MASS.**—The General Electric Co. of Schenectady, N. Y., reports state, will build an extension to the steel plant in Lynn.

**McKEE'S ROCKS, PA.**—The Pennsylvania Malleable Iron Co., organized by R. G. Moldenke, G. S. White and others, has prepared plans for a building, 640x340 ft. There will also be an office building, a storage house, pattern and carpenter shop, all steel frame. The plans were made by Armin Schatte of Pittsburgh.

**MEMPHIS, TENN.**—The Cumberland Telephone Co. will build a \$60,000 office building for which G. W. Thompson of Nashville prepared the plans.

**MINEOLA, N. Y.**—Nassau County will probably soon issue \$100,000 bonds for a court house.

**MONTREAL, QUE.**—The Hon. I. Tarte, the Canadian Minister of Public Works, announces that the Government will build a vast elevator at Montreal.

**NEW ORLEANS, LA.**—The Louisville & Nashville will move the passenger station back 30 ft., and also

build a new train shed and remodel the present passenger station at the foot of Canal St.

**NEW YORK, N. Y.**—The Department of Docks and Ferries will soon begin improving the East River front from Rutgers slip to Catharine slip by building five new piers 80 ft. wide and 500 ft. long. John A. Bense, Department of Docks and Ferries.

Bids are wanted July 24 for the new building to be known as Pavilion F; also for alterations to the Men's Dormitory on Randall's Island, and for a building to be known as the Maternity Waiting Ward on Blackwell's Island. Adolph Simis, Jr., Commissioner of Department of Public Charities.

Plans have been filed with the Building Department for a new library building for the Washington Heights Free Library. Benson & Brockway, architects. The building will be at St. Nicholas Ave. and 155th St., and will of fire proof construction.

**NORWICH, CONN.**—The New York, New Haven & Hartford has prepared plans for a new passenger station and contracts will probably soon be let.

**PARK CITY, UTAH.**—The Rio Grande Western will build a new passenger station.

**PHILADELPHIA, PA.**—Contractors have been given plans for estimates for constructing three modern public school houses, of stone, granite, brick and steel, with steel ceilings, electric work, etc., located as follows: North side of Thompson St., extending from Thirteenth St. to Park Ave., 124.2x120 ft.; at the southeast corner of Twelfth St. and Allegheny Ave., 164x52½ ft., and on Frankford Ave., from Rush St. to Somerset, 124.2x185 ft. A two-story addition, 27x67 ft., will also be built at the Bartram school, at Greenway and Cemetery Aves. The drawings are by Architect Joseph W. Anshutz, and the buildings will be erected under his supervision.

Plans are being prepared for a new building for John Wanamaker, at Thirteenth, Chestnut, Juniper and Market Sts., which it is said will contain 20,000 tons of structural steel for which the Pencoyd Iron Works has the contract.

The Union Traction Co., according to report, has bought property on South Fifth St., on which it will build a brick and iron storage battery house. Two other buildings are also in contemplation.

**REDDING, CAL.**—It is proposed to build a Hall of Records to connect with the jail by a steel bridge. The cost of the improvements is estimated at \$5,975.

**READING, PA.**—Another tube mill, 120x160 ft., will be erected by the Reading Iron Co. Riter & Conley, Pittsburgh, have the contract both for this building and the new forge building, 100x500 ft. in size.

The Philadelphia & Reading, according to report, has prepared plans for new car shops to be located between the present car shops and the roundhouse. Reports state that it has been decided to remove several shops to another location.

**RICHMOND, IND.**—The Union Station is to be enlarged and practically rebuilt.

**RICHMOND, VA.**—Bids have been asked for the new \$350,000 passenger station to be built by the Chesapeake & Ohio and the Seaboard Air Line.

**SALT LAKE CITY, UTAH.**—Frank M. Wilson will build a \$100,000 office building.

**SAN FRANCISCO, CAL.**—The Southern Pacific Co., according to report, will build new shops in Kentucky St.

**SEATTLE, WASH.**—Plans and specifications with bids are asked for August 30 for a fire-proof high school building in school district No. 1. Estimated cost \$200,000. Address Lyman Banks, Secretary.

Reports state that the Northern Pacific will soon build a new depot in Seattle.

**SHREVEPORT, LA.**—The Kansas City, Pittsburgh & Gulf will build new additions to its Shreveport shops and a new boiler house.

**SYRACUSE, N. Y.**—Bids are wanted for the new exhibition hall to be built on the State fair grounds. Address W. W. Taber, 322 South Salina St.

**WEST ALBANY, N. Y.**—The railroad branch of the Y. M. C. A. in West Albany will build a new \$25,000 building. F. W. Chaffee, Chairman of the Board of Directors.

**YOUNGSTOWN, O.**—Contracts, according to report, have been let for a new Children's Home, to be built at Glenwood Ave. and Cleveland St.

#### MEETINGS AND ANNOUNCEMENTS.

##### Dividends.

Augusta & Savannah.—Two and a half dollars per share, payable July 5.

Central of New Jersey.—Quarterly, 1 per cent., payable Aug. 1.

Cincinnati, Hamilton & Dayton.—Quarterly, preferred, 1½ per cent., payable Aug. 8.

Huntington & Broad Top Mountain.—Semi-annual, preferred, 3 per cent., payable Aug. 1.

Louisville & Nashville.—Semi-annual, 1½ per cent., extra ½ per cent., payable Aug. 10.

Northern Pacific.—Quarterly, preferred, 1 per cent., payable Sept. 5.

Albany Ry.—One and a half per cent., and one per cent. extra, payable Aug. 1.

Columbus, St. Ry.—One per cent., payable Aug. 1.

Twin City Rapid Transit.—Semi-annual, common, 1 per cent., payable Aug. 15.

Meetings and conventions of railroad associations and technical societies will be held as follows:

American Association of General Passenger and Ticket Agents.—The annual convention will be held at Boston, Mass., Oct. 17.

American Society of Civil Engineers.—Meets at the house of the Society, 220 West Fifty-seventh street, New York, on the first and third Wednesdays in each month, at 8 p. m.

American Society of Railway Superintendents.—The annual convention will be held at Detroit, Mich., beginning Sept. 20. C. A. Hammond, Secretary, Asbury Park, N. J.

American Street Railway Association and Street Railway Accountants' Association of America.—The annual convention is set for Oct. 17, at Chicago, Ill. T. C. Pennington, Secretary, 2020 State St., Chicago.

Association of Engineers of Virginia.—Holds its formal meetings on the third Wednesday of each



month from September to May, inclusive, at 710 Terry Building, Roanoke, at 5 p. m.

**Association of Railway Superintendents of Bridges & Buildings.**—The annual convention will be held Oct. 17, in Detroit, Mich. S. F. Patterson, Secretary, Concord, N. H.

**Boston Society of Civil Engineers.**—Meets at 715 Tremont Temple, Boston, on the third Wednesday in each month at 7.30 p. m.

**Canadian Roadmasters' Association.**—The annual convention will be held at Toronto, Sept. 20. J. Drinkwater, Secretary, Winchester, Ont.

**Canadian Society of Civil Engineers.**—Meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday at 8 p. m.

**Central Railway Club.**—Meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

**Chicago Electrical Association.**—Meets at Room 1737, Monadnock Building, Chicago, on the first and third Fridays of each month at 8 p. m. J. R. Cravath, Secretary.

**Civil Engineers' Club of Cleveland.**—Meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

**Civil Engineers' Society of St. Paul.**—Meets on the first Monday of each month except June, July, August and September.

**Denver Society of Civil Engineers.**—Meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month, except during July and August.

**Eastern Maintenance of Way Association.**—The annual convention will be held Sept. 26 to 29 at Portland, Me. F. C. Stowell, Ware, Mass., Secretary.

**Engineers' Club of Cincinnati.**—Meets at the rooms of the Literary Club, 25 East Eighth street, on the third Tuesday of each month, excepting July and August, at 6.30 p. m.

**Engineers' Club of Columbus, (O.)**—Meets at 12½ North High street on the first and third Saturdays from September to June.

**Engineers' Club of Minneapolis.**—Meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

**Engineers' Club of St. Louis.**—Meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

**Engineers' Society of Western New York.**—Holds regular meetings on the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

**Engineers' Society of Western Pennsylvania.**—Meets at 410 Penn avenue, Pittsburgh, Pa., on the third Tuesday in each month, at 7.30 p. m.

**Locomotive Foremen's Club.**—Meets every second Tuesday in the club room of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn street, Chicago.

**Master Car & Locomotive Painters' Association.**—The annual convention will be held Sept. 12 at Philadelphia, Pa. Robert McKeon, Secretary, Kent, O.

**Montana Society of Civil Engineers.**—Meets at Helena, Mont., on the third Saturday in each month at 7.30 p. m.

**New England Railroad Club.**—Meets at Pierce Hall, Copley Square, Boston, Mass., on the second Tuesday of each month.

**New York Railroad Club.**—Meets at 12 West Thirty-first street, New York City, on the third Thursday in each month at 8 p. m., excepting June, July and August.

**Northwest Railway Club.**—Meets on the first Tuesday after the second Monday in each month at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

**Northwestern Track and Bridge Association.**—Meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

**Roadmasters' Association of America.**—The annual convention will be held in Detroit, Mich., Sept. 12. J. B. Dickson, Secretary, Sterling Ill.

**St. Louis Railway Club.**—Holds its regular meeting on the second Friday of each month at 3 p. m.

**Southern and Southwestern Railway Club.**—Meets at the Kimball House, Atlanta, Ga., on the second Thursday in January, April, August and November.

**Technical Society of the Pacific Coast.**—Meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

**Traveling Engineers' Association.**—The annual convention will be held in Cincinnati, O., Sept. 12. W. O. Thompson, Secretary, Elkhart, Ind.

**Western Foundrymen's Association.**—Meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is Secretary.

#### New York Railroad Club.

The next regular meeting of the New York Railroad Club will be held Sept. 21 at the rooms of the New York Transportation Club, Forty-second street and Madison avenue.

#### St. Louis Railway Club.

Through the courtesy of the Wiggins Ferry Company, the members of the St. Louis Railway Club and their families went on a moonlight trip on the Mississippi River July 18, on the steamer "Andrew Christy."

#### Southern and Southwestern Railway Club.

The next regular meeting of the Southern and Southwestern Railway Club will be held at the Kimball House, Atlanta, Ga., at 10 a. m. on Tuesday, August 10. The following subjects will be discussed: "The M. C. B. Interchange Rules—Review of the Work at the M. C. B. Convention;" "Durability of Different Colors of Paint for Passenger and Freight Equipment in the South," by Messrs. T. S. Lloyd, W. L. Tracy and John S. Cook; and "Pneumatic Cleaning Plants for Passenger Equipment," by Messrs. W. L. Tracy, P. Leeds and J. Cullen. A committee consisting of Messrs. W. E. Symons, R. H. Johnson and T. S. Lloyd will report on "Electric Lighting for Passenger Cars."

#### Engineers' Club of Cincinnati.

The 107th regular meeting of the club was held in the rooms of the Literary Club, 25 E. 8th St. on June 15th. Dinner was served at 6:15 P. M. and the regular meeting called to order at 7:10 P. M. with 18 members and 3 visitors present.

Mr. W. B. Ruggles, now at Matanzas, Cuba, presented the Club, through Mr. R. L. Read, a gavel made from wood taken from the Santa Christina Barracks at Matanzas, which was built some fifty or more years ago.

Dr. Thomas Evans, Instructor in Technical Chemistry at the University of Cincinnati, read a paper on "Fuel Gas," devoted principally to discussions and descriptions of processes for the manufacture of fuel gas for use in metallurgical works.

Mr. L. E. Bogen read a paper under the title of "Testing Iron and Steel," in which he reviewed what has been accomplished in determining the quality of these metals by microscopical inspection.

The club adjourned to meet again on the regular meeting night in September.

#### International Association for Testing Materials.

The second annual meeting of the American section of the Association will be held Tuesday and Wednesday, Aug. 15 and 16, at Pittsburgh, Pa. The hotel headquarters will be at the Monongahela House and the sessions will be held in the rooms of the Engineers' Society of Western Pennsylvania. The meeting opens with a business session at 10.30 on Tuesday. In the afternoon, an inspection trip will be made to the Edgar Thompson Steel Works, and at 6.30 there will be an informal dinner at the Monongahela House. At the evening session there will be an address by the Chairman, a preliminary report of the American members of the International Committees on Standard Specifications and Methods of Testing Iron and Steel, and a discussion on Standard Specifications for Iron and Steel.

At the session Wednesday morning, preliminary reports will be presented of the American members of the international committees on cement, stone and paints. A preliminary report will be presented by the Committee on Impact Tests, and a paper read on Comparison of Steel Plates in Flexure and Tension, by Prof. William K. Hatt. In the afternoon opportunity will be given for visiting the works of the Westinghouse Electric & Mfg. Company and other industrial works. In the Technical column this week will be found a reference to some special work undertaken by Committee No. 5 of the American section.

#### PERSONAL

(For other personal mention see Elections and Appointments.)

—Mr. Charles J. Pusey, President and General Manager of the Irondale, Bancroft & Ottawa RR., died at Peterborough, Ont., July 16. Mr. Pusey was born in Chester County, Pa., in 1837.

—Mr. William H. Stearns, late Master Mechanic of the Connecticut River road, died at his home in Springfield, Mass., July 14, at the age of 77. Mr. Stearns was Master Mechanic of the Connecticut River road from 1872 until the road was leased to the Boston & Maine in 1895. He was for many years a locomotive runner and a foreman on the Boston & Albany and its predecessor, the Western Railroad, where he began service with Wilson Eddy about 1841.

—Mr. Russell Farnham Lord, a civil and mining engineer, died in New York, July 12, at the age of sixty-one years. Mr. Lord was the son of Russell F. Lord, Sr., for many years engineer to the Delaware & Hudson Canal Company. He was graduated from the Sheffield Scientific School. He also served the Delaware & Hudson as engineer. When the civil war broke out he was commissioned brigadier general of volunteers by Governor Curtin of Pennsylvania, and served through the war in mustering and organizing regiments. Then he went West, to take up mining engineering. In 1886 Mr. Lord became engineer to the government of Ecuador. Six years later he was sent to Ecuador to develop the mining property of the Playa de Oro Company. In 1897, because of failing health, Mr. Lord returned to New York.

#### ELECTIONS AND APPOINTMENTS.

**Boston & Maine.**—William R. Mooney, heretofore Trainmaster at Concord, N. H., has been appointed Superintendent of the Concord Division, succeeding H. E. Chamberlin, resigned.

**Buffalo, Rochester & Pittsburgh.**—George F. Merchant, heretofore assistant to the President, has been appointed General Superintendent.

**Canadian Pacific.**—Charles Drinkwater, Secretary, has been appointed Assistant to President T. G. Shaughnessy. R. G. Heward, for several years Assistant to Sir William C. Van Horne, has been appointed Assistant to Mr. Drinkwater.

Herbert Carter has been appointed General Passenger Agent at Hong Kong, China.

**Chicago, Burlington & Quincy.**—L. W. Berry has been appointed Superintendent of the St. Louis Division, succeeding W. G. Besler, resigned. Effective July 22. R. M. Kimber has been appointed Assistant Superintendent of the Galesburg Division. Effective Aug. 1.

**Chicago, Rock Island & Pacific.**—W. J. Leahy has been appointed General Eastern Passenger Agent, with headquarters at 305 Broadway, New York, succeeding Chas. Kennedy, transferred. Hal. S. Ray has been appointed Passenger Agent Middle District, with headquarters at 111 South Ninth St., Philadelphia, Pa., succeeding W. J. Leahy. Effective July 10.

**Copper Range.**—George W. Taylor, formerly Master Mechanic of the Wisconsin, Michigan & Northern, has been appointed Master Mechanic of the C. R., with headquarters at Houghton, Mich. A. A. McFall has not been appointed Superintendent of the C. R., as stated July 7, p. 498.

**Elkton & Middletown.**—At a meeting of the stockholders C. B. Finley and L. M. Haines of Elkton were elected Directors, succeeding John P. Green and George V. Massey, resigned.

**Fitchburg.**—J. R. Watson, General Passenger Agent, with headquarters at Boston, Mass., has resigned.

**Gainesville & Gulf.**—At a meeting of the stockholders, held July 12, W. C. Shaw, J. M. Johnston and J. J. Barr, were elected Directors.

**Great Northern.**—J. McGie, heretofore Master Mechanic of the Montana Division of the G. N., has

been appointed Master Mechanic of the Montana Central Ry., a subordinate line of the G. N.

**Green Bay & Western.**—At a meeting of the stockholders, W. W. Cargill was elected Vice-President and J. C. Thurman was elected a Director.

**Intercolonial.**—The duties of the Engineer's Department have been divided and W. B. Mackenzie, heretofore Chief Engineer of Construction and Maintenance of Way, has been appointed Chief Engineer of Construction, and T. C. Burpee, heretofore Assistant Engineer, has been appointed Engineer of Maintenance of Ways and Works.

**Kewaunee, Green Bay & Western.**—At a meeting of the stockholders, J. C. Thurman was elected Director.

**Lake Region, Manatee River & Gulf.**—The officers of this company, referred to in the Construction column, are: President, Augustus Tremaine; Vice-President and General Manager, W. B. Tucker; Treasurer, A. McCollum; Secretary, C. G. Butt. The principal office is Orlando, Fla.

**Minnesota Transfer.**—L. F. Day, General Manager of the Minneapolis & St. Louis, has been elected President of the M. T.

**Missouri Pacific.**—J. T. Stafford has been appointed Acting Division Master Mechanic, with headquarters at Baring Cross, Ark.

**Muscataine North & South.**—J. A. Nelson of Minneapolis, Minn., has been appointed General Manager.

**Nashville, Chattanooga & St. Louis.**—Chas. W. Stevenson has been appointed Assistant Auditor of Receipts, succeeding C. F. Frizzell, resigned.

**New York Central & Hudson River.**—James Buchanan of West Albany, N. Y., and G. H. Haselton of Depew, N. Y., heretofore Assistant Superintendents of Motive Power, have been appointed Division Superintendents of Motive Power. P. T. Longergan, heretofore Master Mechanic, has been appointed Division Superintendent of Motive Power on the Rome, Watertown & Ogdensburg Division. The jurisdiction of James Macbeth, Master Car Builder at East Buffalo, N. Y., has been extended over the entire Western Division. The office of Master Car Builder at Rochester, N. Y., has been abolished. The jurisdiction of F. W. Chaffee, Master Car Builder at West Albany, N. Y., has been extended over the Middle Division, and the jurisdiction of S. T. Case has been extended over the Hudson Division. The headquarters of George Thompson, Division Superintendent of Motive Power, has been transferred from Jersey Shore, Pa., to Corning N. Y.

**Norfolk & Western.**—James C. Cassell has been appointed General Superintendent, with headquarters at Roanoke, Va., succeeding L. E. Johnson. Effective July 15. (July 14, p. 514.)

J. W. Cook, heretofore Superintendent of the Shenandoah Valley Division, has been transferred to the Radford Division. Theodore Low, heretofore Superintendent of the Durham Division, has been transferred to the Shenandoah Valley Division, succeeding J. W. Cook. The Durham and Norfolk Divisions have been consolidated in charge of Edmund L. DuBarry, Superintendent.

**Northern Pacific.**—John S. Kennedy has been elected a Director, succeeding John G. Moore, deceased.

**Philadelphia & Reading.**—A. M. Wilson, Division Superintendent at Reading, Pa., has been transferred to the Reading & Columbia Division, succeeding O. S. Doolittle, resigned. W. G. Besler, heretofore Division Superintendent of the Chicago, Burlington & Quincy at Beardstown, Ill., has been appointed Division Superintendent of the P. & R., with headquarters at Reading, Pa., succeeding Mr. Wilson.

**Pittsburgh & Lake Erie.**—E. C. Brown has been appointed Principal Assistant Engineer, with headquarters at Greenville, Pa.

**Red River & Southwestern.**—The officers of this company, referred to in the Construction column, are: President, W. B. Worsham; Vice-President and Treasurer, W. H. Featherstone; Secretary and General Manager, E. B. Carver. The central office is Henriette, Tex.

**Rochester & Lake Ontario.**—At the annual meeting of the stockholders William Purcell, A. Yost and Francis B. B. Mitchell were elected Directors.

**Southern.**—A. J. Frazer, Division Superintendent at Birmingham, Ala., has been transferred to the Atlanta Division, succeeding W. A. Vaughan. C. S. Hayden, heretofore Trainmaster, has been appointed Assistant to Mr. Frazer. C. L. Ewing, Division Superintendent at Selma, Ala., has been transferred to the Birmingham Division, succeeding Mr. Frazer.

#### RAILROAD CONSTRUCTION, New Incorporations, Surveys, Etc.

**ASHLAND & WOOSTER.**—Trains are reported running between Jeromeville, O., and Ashland at the western terminus of the road, and the line is completed to a point near West Lebanon. The line as projected is from Jewett, O., through Stark County, 52 miles to Ashland. H. B. Camp of Akron, O., is President and General Manager. (Jan. 6, p. 15.)

**ATLANTIC COAST LINE.**—Grading is just begun with 300 convicts on the southeastern extension from Ashpole, N. C. (now Union City), southeast 10½ miles to Boardman (formerly Hub). N. G. Wade of Ashpole has the contract. The maximum grades are 0.6%, and the maximum curves 3°. There will be one bridge over the Lumber River and one mile of trestle work. (July 7, p. 499.)

**BARCLAY.**—I. O. Blight, Superintendent, is reported as stating that the company is ready to begin work within ten days to build the road from Cedar Lodge to Towanda. But it seems that the Bradford Central is loth to surrender the right of way to the Barclay Company. Secretary Sawyer of the Central Company has called a meeting of the directors to decide whether to build or not to build the proposed road, or allow others to take hold of the project. (Feb. 10, p. 107.)

**BAY & COAST.**—This company, whose incorporation on June 27 has been already noted (July 7, p.



499), is projected from San Francisco, Cal., south about 100 miles through the counties of San Mateo and Santa Cruz to the city of Santa Cruz. It has a capital stock of \$3,000,000, of which \$110,000 is subscribed. It is to be double track, standard gage, and operated by steam, electricity, gasoline motors or compressed air. The incorporators are: L. H. Barnard, Oakland; Thomas J. Sunny, James G. Hughes, H. Lacy and Michael J. Cochrane, San Francisco.

**BELLINGHAM BAY & EASTERN.**—Grading is reported in progress on the line from Lake Whatcom, Wash., into timber lands, 20 miles. (June 30, p. 482.)

**BURLINGTON, CEDAR RAPIDS & NORTHERN.**—This company has decided to extend the Doves-Armstrong branch of the Cedar Rapids, Iowa Falls & Northwestern division from Armstrong, Ia., west 18 miles to Estherville on the main line. The survey was made in 1892, and grading is begun near Armstrong. The intention is to build the line by the middle of September.

An official writes that the company does not expect to extend its line from Greene, Ia., to Forest City, and that no surveys have been made by the company. The Chicago & Northwestern is building a line through this territory. (July 7, p. 499.)

**CALUMET WESTERN.**—The Chicago City Council on July 6 granted to this company a franchise to build its double track line along the Calumet River in South Chicago, from 106th to 130th Sts., with trackage privileges on both sides of the river and approaches to all docks in the vicinity. The company is to pay the city rental for all street intersections at a rate to be agreed upon annually by arbitration. The line must be built and in operation within 18 months. It is to be a terminal road, built jointly by the Pennsylvania Co., the Michigan Central and the Chicago, Rock Island & Pacific. (June 2, p. 393.)

**CENTRAL BRANCH.**—This company, successor to the Central Branch Union Pacific and controlled by the Missouri Pacific, in its recent re-incorporation made provisions for an extension of its line west to the Colorado State line. This is understood to be an extension to Denver, Colo.

**CENTRAL NEW YORK & WESTERN.**—This company applied to the Railroad Commission for permission to extend its road 60 miles in Wayne County, to Macedonia, there to connect with the New York Central & Hudson River. This would give direct lines from Hornellsville and Wayland to Macedonia. In the extension the tracks of the Lehigh Valley, the Erie, the Northern Central and the Delaware, Lackawanna & Western roads would have to be crossed. The Commission adjourned the matter for two weeks.

**CHESAPEAKE & OHIO.**—Contracts were to be let July 10 for the Greenbrier extension from Whitcomb, W. Va., on the main line, to run up Greenbrier River, about 95 miles through Marlinton to the forks. (April 14, p. 271.)

**CHICAGO, INDIANA & EASTERN.**—Track is now laid within a short distance of Converse, Ind., on the extension from Swayzee north seven miles. When this section is completed, the line will be extended toward Richmond. (June 2, p. 393.)

**CHICAGO, INDIANAPOLIS & LOUISVILLE.**—Indiana press reports state that the Indiana Stone line from Bedford, Ind., into stonefields, 9½ miles, is completed. (I. S., Sept. 30, 1898, p. 713.)

**CUBAN CENTRAL.**—Gen. A. G. Greenwood, promoter of this line, has returned to New York. He states that the company has \$25,000,000 ready to begin work. The route is surveyed, the bridges built, maps and drawings completed, contracts let and arrangements are made for shipping materials. The only blocking of the work is the refusal of the Government to grant right of way across the Island. The railroad is designed to connect Santiago Province with Havana. (Cuban Railroads, June 30, p. 482.)

**DECKERVILLE, OSCEOLA & NORTHERN.**—Regular trains began running July 9 on the line from Deckerville, Ark., northeast 33 miles to Osceola. It was completed to Wardell, 12 miles, last year. It is proposed to extend to Blytheville, about 20 miles further. E. M. Ford of Deckerville is Vice-President and General Manager. (June 16, p. 439.)

**DETROIT & TOLEDO SHORE LINE.**—James King Duffy of Toledo, O., Secretary of the company, has made the following statement:

Our company was incorporated in Michigan, March 31st 1898, under the title of Pleasant Bay Railway Co., and in April, 1899, the title was changed to the present one, Detroit & Toledo Shore Line RR. Co. Capital stock was increased to \$1,500,000 and the line extended to Detroit, with authority to purchase the property of the Toledo & Ottawa Beach Railway, an Ohio corporation extending from Toledo, Ohio, to the Michigan State line, giving this company a complete line from Toledo to Detroit. The property of the Toledo & Ottawa Beach has been acquired in accordance with such authority. The mortgage of \$100,000, referred to in the clipping, is an error, and arises evidently from confusing the item of \$100,000 provided in the mortgage to the Illinois Trust & Savings Bank for the purchase of the property of the Ottawa Beach Company.—The Chronicle.

**ELLWOOD & SOUTHERN.**—This company was recently incorporated for an extension south of the Beaver & Ellwood. (Railroad News column.)

**ERIE.**—An official writes with reference to the proposed raising of tracks of the Greenwood Lake Division at Valley Road, Montclair, N. J., that the company has now a proposition before the Chancellor of New Jersey. (July 14, p. 515.)

**EVERETT & MONTE CRISTO.**—Foley Bros. of St. Paul, Minn., according to report, have taken the contract for restoring this line, which was partially destroyed by floods some two years ago. (March 17, p. 197.)

**FLINT & PERE MARQUETTE.**—Ties are being gotten out, according to report, for double tracking the line between Baldwin, Mich., and Ludington, 30 miles.

**INTERNATIONAL & GREAT NORTHERN.**—With reference to the improvements on this line, an official writes that the work in progress is mostly the reduction of grades from the present maximum of 66 ft. per mile to 31 ft., and the substitution of masonry and iron culverts for bridges wherever practicable. The reduction of grade is at present confined to the lines between Palestine, Tex., and the Gulf, while the substitution of culverts for bridges is quite gen-

eral over the entire line. The company expects to complete the reduction of grades between Palestine and the Gulf in time for the heavy traffic of September. (May 12, p. 343.)

**IOWA CENTRAL.**—Hamilton Browne of Marshalltown, Ia., President of the Marshalltown & Dakota line, is reported as saying that 19 miles of the road is to be built from Story City, Ia., to Gowrie this year. The ultimate terminal is a point in South Dakota. (April 14, p. 271.)

**IOWA, MINNESOTA & NORTHWESTERN.**—The articles of incorporation of this company have been amended, changing the line so as to run from Belle Plaine, Ia., northwest to Mason City, and thence through the counties of Worth and Winnebago to the northern boundary of the State, opposite the town of Keister, Minn., about 136 miles, with power to extend in other states. The capital stock is increased from \$200,000 to \$1,500,000. W. E. Bryce of Mason City is President, and J. B. Redfield, Chicago, Secretary. The Chicago & Northwestern is understood to be back of the project. (June 16, p. 439.)

**JACKSONVILLE & SOUTHWESTERN.**—Track is laid, according to report, for 10 miles west from Commer's Mill, near Jacksonville, Fla., and rails are going down at the rate of a mile a day. By Aug. 15 it is expected that connection will be made with the Florida Central & Peninsular, 23 miles, and train running will be begun at once. Surveyors are locating the southern end of the route. The line as projected is from Jacksonville southwest 105 miles to Manatee. J. M. Barnett is President, and Geo. W. Davis, Chief Engineer, both of Jacksonville. (June 9, p. 147.)

**JONESBORO, LAKE CITY & EASTERN.**—The capital stock of this company has been raised from \$250,000 to \$450,000 for its extension from Nettleton, Ark., into Jonesboro, four miles, and for its extension eastward to Luxora.

**LAKE REGION, MANATEE RIVER & GULF.**—This company has been incorporated in Florida to build a railroad from a point on the Tavares & Gulf, in Lake County, to run southwest about 100 miles through Lake, Polk, Millsboro and Manatee counties to a point on Manatee River, with a connecting branch through the counties of Polk, De Soto and Lee to a point on the Gulf coast of Florida. The officers are given under Elections and Appointments.

**LAKE TAHOE.**—Over 100 men are at work on the line from Truckee, Cal., south 15 miles to Tahoe City on Lake Tahoe, and the company expects to have the line completed before September. D. L. Bliss of Carson City, Nev., is President and General Manager. (June 23, p. 461.)

**LITTLE ROCK, HOT SPRINGS & TEXAS.**—The City of Hot Springs, Ark., has granted right of way privileges through the city for this proposed line from Little Rock west 155 miles to Wister, I. T. It was completed in 1895 from Benton, Ark., to the Sabine River, four miles, and has been graded to Hot Springs, 31 miles. (April 21, p. 289.)

**MCCLLOUD RIVER.**—This company has laid 10 miles of track from McCloud Station, Cal., toward Lakeview and into the timber belt. (Jan. 27, p. 73.)

**MILWAUKEE, BENTON HARBOR & COLUMBUS.**—This company has petitioned the South Bend Council that the franchise rights for the extension in that city from Buchanan, Mich., south about 15 miles, be extended to July 15, 1900. An effort is being made to enlist Eastern capital for building the extension.

**NEW YORK CENTRAL & HUDSON RIVER.**—This company, according to report, will build a switch at Utica, N. Y., over the tracks of the West Shore line, near the New York, Ontario & Western crossing, to run through New York Mills to accommodate the manufactories of Walcott & Campbell in that village.

**NEW YORK ROADS.**—A spur 2½ miles long is to be built, according to report, from De Kalb Junction, on the New York Central & Hudson River, east to stella mines near Herman. Otto G. Myer of New York, and A. L. McCrea of De Kalb are reported interested in the mines.

**NORFOLK & WESTERN.**—The line from Abingdon up the Shady Valley via Damascus, Va., is not being built by this company, but by private individuals. It is probably the line under the incorporation of the Shady Valley. (July 14, p. 515.)

**NORTHERN PACIFIC.**—An effort is being made to obtain Government aid for the proposed branch from Elgin, Manitoba, on the Belmont-Hartney branch, to run southwest about 40 miles to Wascada. Surveys are completed.

A deputation from Brandon, Man., waited on the Hon. Thomas Greenway, Premier of Manitoba at Winnipeg, on July 12, and solicited aid for the extension into Brandon. The Premier promised to meet the wishes of the delegation, but intimated that he was waiting for a reduction of rates on the part of the company.

**OSHKOSH & STEVENS POINT.**—The Winnebago Construction & Contracting Co. has been incorporated in Wisconsin to build this new line from Stevens Point southwest about 70 miles to Oshkosh. H. E. Harshaw and David Pinkerton are among the incorporators.

**PENNSYLVANIA COMPANY.**—An official writes that grading and masonry have been authorized for the extension of double track from Winslow, Ind., to Wanatah, six miles; Adams, Ind., to Elida, O., 47 miles, and from Lafayette, O., to Dunkirk, 13 miles. Sealed proposals will be received by the Chief Engineer until noon, July 24. (July 14, p. 515.)

**PENNSYLVANIA ROADS.**—Barclay Bros., coal operators of Bradford County, Pa., will build, according to report, a railroad from Canton, Pa., on the Northern Central line of the Pennsylvania, to run east about 20 miles to Towanda on the Lehigh Valley.

**PORTAGE DU FORT & BRISTOL BRANCH.**—After the rejection of the first bill a new bill has been passed, with some amendments, whereby the company is incorporated to build from Pembroke, Ont., east to Guvon, with running powers over the Pontiac Pacific Junction from that point to Hull, Que. (July 7, p. 500.)

**RED RIVER & SOUTHWESTERN.**—Work is to be begun soon, according to report, on this newly

projected line from Henrietta, Tex., on the Missouri, Kansas & Texas, to run southwest about 150 miles via Archer City to Abilene on the Texas & Pacific. The officers are given under Elections and Appointments.

**RIO GRANDE WESTERN.**—The General Manager writes that the company is building a branch from Scofield, Utah, to Clear Creek coal mine, five miles. It runs through no towns. (July 7, p. 500.)

**ST. LOUIS & SAN FRANCISCO.**—Surveys are to be begun Sept. 1, according to report, for an extension of the Kansas Midland line from Wichita, Kan., south via Pawnee, Okla., and McAlester, I. T., to Texarkana, Ark., and Denison, Tex. Citizens along the line have already guaranteed \$80,000 of aid.

**SAN ANTONIO & BROWNSVILLE.**—This company was incorporated in Texas July 15, with a capital stock of \$275,000, to build a railroad from San Antonio, Tex., south about 275 miles to Brownsville. L. G. Hart and J. M. Nix of San Antonio are incorporators.

**SAN DIEGO, CUYAMACA & EASTERN.**—The General Manager writes that there is no extension in prospect from Foster, Cal., for about 65 miles into the desert. (July 30, p. 483.)

**SEABOARD AIR LINE.**—The sub-contractors for the line now built from Cheraw, S. C., are Brooks Bros., Malone, Ga., W. A. Jackins, Blockburg, S. C.; the trestles from Camden to Cheraw, Russell & Co., Cheraw; for the trestles from Camden to Columbian, Henry Jackson, Cheraw. (July 14, p. 515.)

**SEATTLE & SAN FRANCISCO.**—This company has asked the Board of Public Works of Seattle, Wash., for permission to begin building its line within the city. The road as projected is from a point on Puget Sound near Seattle, to run southwest about 30 miles to Palmer on the Northern Pacific. W. E. Guerin of Seattle is President. (May 19, p. 360.)

**SIERRA VALLEYS.**—Surveys are reported in progress for the extension from Plumas, Cal., southeast about 25 miles to Reno, Nev. (Feb. 10, p. 109.)

**SOMERSET.**—This company has changed the location of about three-fourths of a mile of track near the bank of the Kennebec River. Considerable trouble has been given by washouts.

**SOUTHERN.**—Surveys are reported completed for the extension from Burgin, Ky., southeast about 12 miles to Lancaster on the Louisville & Nashville. (June 30, p. 483.)

**SOUTHERN PACIFIC.**—This company is building four sidings, each 2,000 ft. long, on the line between Bakersfield, Cal., and Mojave, in the vicinity of Pampa, Callente, Bealville, Keene and Girard, on account of the increased traffic from the trains of the Atchison, Topeka & Santa Fe, now running over that section.

**TEXAS MIDLAND.**—Surveys are completed and right of way secured, according to report, for the extension from Ennis, Tex., southwest about 70 miles to Waco. (June 23, p. 462.)

**TRENTON, LAWRENCEVILLE & PRINCETON.**—Trains are running on two miles of the line between Trenton and Lawrenceville, and the road has been extended three miles out of Trenton. It is to run from Trenton, N. J., northeast about 15 miles via Lawrenceville to Princeton. Four iron bridges, two of which are 50 ft. in length and two 25 ft., have been completed. The grading is being done under Col. Hurley, contractor. James L. Branson of Langhorne, Pa., is President, and Wilbur Sadler of Philadelphia is Secretary. W. B. Parry of Langhorne is General Manager.

**WHITE PASS & YUKON.**—This line was completed to Lake Bennett, about 40 miles from Skaguay, Alaska, on July 6. (June 9, p. 418.)

#### GENERAL RAILROAD NEWS.

**BEAVER & ELLWOOD.**—This property has been leased for a period of 20 years to the Pittsburgh & Lake Erie. It has been operated for some time under temporary lease to that company. The lease carries with it control of a recent incorporation, the Ellwood Southern, which would extend the line to the coal mines south of Ellwood, Pa. The line now runs from Ellwood to Ellwood Junction, 2.91 miles.

**BOSTON TERMINAL.**—The Massachusetts State Railroad Commission on July 13 authorized an additional issue of \$1,500,000, raising the total to \$14,500,000.

**CANADA ATLANTIC.**—The Canadian House of Commons Railway Committee has reported the bill providing for the amalgamation of the Ottawa, Arnprior & Parry Sound line with this company. (March 31, p. 237.)

**CANADIAN PACIFIC.**—The trustees of the mortgage of Sept. 1, 1881, have set aside \$225,000 to buy these bonds at a rate not to exceed 110 and accrued interest. Proposals will be received up to Aug. 8 by Chas. Drinkwater, Secretary, Montreal.

**CATONSVILLE SHORT LINE.**—A syndicate headed by W. Howard White of Baltimore is reported to have bought this line, which extends from Catonsville, Md., to a junction with the Baltimore & Potomac, 3.8 miles. It is stated that two members of the syndicate are officials of the Baltimore & Ohio.

**CENTRAL OHIO.**—The stockholders of the reorganized company will vote Aug. 8 on a proposed amendment to the lease now held by the Baltimore & Ohio. The stockholders have assented to the B. & O. reorganization plan. (May 5, p. 325.)

**CHICAGO TERMINAL TRANSFER.**—Press reports from Chicago state that control of this property has been secured by the Harriman syndicate which controls the Chicago & Alton.

**COLUMBUS, SANDUSKY & HOCKING.**—The committee of the general mortgage bonds, of which John G. Carlisle, New York, is chairman, invite bondholders without delay to deposit their bonds with the North American Trust Co., New York, under the agreement of Nov. 19, 1898. This request is in view of the recent court actions. (July 14, p. 516.)

**JACKSONVILLE & ST. JOHNS RIVER.**—This company, successor to the Jacksonville, Tampa & Key West, and now a part of the Plant System, has issued a new mortgage for \$1,500,000 gold four per



cent. bonds due 1934. Of this amount \$1,350,000 is now outstanding and the rest is to be issued at the rate of \$50,000 for improvements, etc. The capital stock of the company was made \$20,000, which was exchanged after the consolidation for a like number of shares of the Savannah, Florida & Western. (May 19, p. 361.)

**KANSAS CITY & OMAHA.**—The report of the Special Master in the matter of foreclosure sale shows that after a payment of expenses and taxes, as authorized by the court, there are no funds applicable for payment upon the first mortgage bonds. The receivers recently advertised that on July 6 they would be ready to pay at their office in Boston, the amounts due on each bond with the coupon of Jan. 1, 1894, as the final dividends derived from the unmortgaged assets of the St. Joseph & Grand Island and the K. C. & O., or \$9.11 per \$1,000 bond. This property was sold under foreclosure July 8, 1896, and was bid in by the bondholders, who organized the present company in September, 1896. Since the surrender of the property by the receivers on Nov. 1, 1896, it has been operated in connection with the St. J. & G. I.

**LEAVENWORTH, TOPEKA & SOUTHWESTERN.**—Bondholders are notified to communicate with C. H. Venner & Co., 86 State St., Boston, for the purpose of locating scattered bonds. The recent adjustment affected only bonds directly involved in the litigation. Foreclosure sale has been postponed until Aug. 9. (June 23, p. 462.)

**MANHATTAN (ELEVATED).**—This company has executed a consolidated mortgage for \$40,000,000 four per cent. bonds which are to be used to replace existing bonds. It is authoritatively stated that of the recent sale of \$18,000,000 new stock, \$6,000,000 has been used to pay old right of way judgments which were drawing interest at six per cent. The remaining \$12,000,000 has been loaned for the benefit of the stockholders. (June 23, p. 462.)

**NORTHERN PACIFIC.**—The United States Circuit Court of Appeals, on July 13 at St. Paul, handed down a decision holding that the terminus of the company is at Ashland, Wis., and not Duluth, and that the company is therefore entitled to 1,000,000 acres of land which the Government has sought to have excluded from the land grant. (June 30, p. 484.)

The election of John S. Kennedy, a prominent stockholder of the Great Northern, as a director in the N. P., is stated by high authorities to mean that the two companies are now working in entire harmony. This would avert any rate wars or duplication of new lines in the Northwest, which have been threatened in recent months.

**OREGON RAILROAD & NAVIGATION.**—The Central Trust Co., New York, gives notice to its holders of preferred and common stock certificates that the voting trust agreement between representatives of the Central Trust Co. and the railroad, dated Aug. 19, 1896, have been terminated by guaranty in pursuance of the agreement, and all holders of the trust certificates have the right to surrender the same in exchange for stock. Temporary printed certificates will be delivered in exchange for trust certificates until Aug. 1, when engraved certificates will be ready for delivery.

**PENNSYLVANIA COMPANY.**—The Treasurer of the Erie & Pittsburgh will receive bids up to Aug. 13 for as many 3½% general mortgage bonds of that company as \$36,580 will buy at a rate not to exceed par and interest.

**PITTSBURGH & WESTERN.**—The Lake Erie & Western has sold its holdings of \$2,052,000 of the total issue of \$3,500,000 of Pittsburgh & Western second mortgage bonds to the Baltimore & Ohio. The B. & O. already holds a large block of these bonds, and it is understood that this sale carries with it a practical control of the line. (Nov. 18, 1898, p. 840.)

A preferred stockholders' committee, composed of A. Foster Higgins, J. Harsen Rhoades and Charles W. Baker, invites holders of this stock to deposit their certificates with the Knickerbocker Trust Co., New York, on or before Aug. 15. Each deposit will be subject to an assessment of not to exceed 25 cents per share to meet the expenses of the committee. The committee will cause a thorough examination to be made of the physical and financial condition of the property and its earning capacity, and will then present to depositing stockholders some scheme of readjustment which will afford protection to their equity in the property. (July 7, p. 500.)

**RUTLAND.**—E. H. Rollins & Sons, Boston, offer \$600,000 of the recently issued \$1,100,000 Rutland-Canadian four per cent. 50-year first mortgage gold bonds at 101 and accrued interest. The other \$500,000 is already disposed of. (July 14, p. 516.)

**SAN FRANCISCO & NORTHERN PACIFIC.**—Holders of first mortgage bonds are notified that 23 of these have been drawn for payment for the sinking fund by the Mercantile Trust Co., on Feb. 8, 1900. (June 23, p. 462.)

**SOUTHERN PACIFIC.**—The stockholders will vote July 26 upon a proposition to increase the capital stock from \$150,000,000 to \$200,000,000, to carry out the plan for acquiring the stock of the Central Pacific.

**WISCONSIN CENTRAL.**—By an amendment to the articles of incorporation of the new company, the capital stock is fixed at \$30,000,000 instead of \$25,000,000, of which \$17,500,000 is to be common, and \$12,500,000 preferred, with four per cent. non-cumulative dividends. (July 14, p. 516.)

## TRAFFIC.

### Traffic Notes.

The Southern Pacific has brought suit for an injunction to forbid the use of the reduced rates for the transportation of rice recently ordered by the State Railroad Commission of Louisiana.

The New York Central now issues 1,000-mile tickets for \$20, good on all of the lines controlled by itself east of Buffalo, and also on the Philadelphia & Reading, the Buffalo, Rochester & Pittsburgh, and two or three smaller roads.

Mr. W. W. Finley, Third Vice-President of the Southern Railway, has been chosen as third arbitrator to act with Messrs. Goddard and Donald in considering the question of differential passenger rates between New York and Chicago.

The Freight Rate Committee of the Board of Trade of Birmingham, Ala., is to establish a Bureau, with a commissioner in charge. The commissioner has already been selected, though it does not appear that the Board of Trade has yet confirmed his appointment.

The Chicago & Northwestern has put in service on four of its trains between Chicago and Menominee and Chicago and Milwaukee cafe parlor cars which are a combination of parlor, dining and cafe cars. Meals are served in the dining compartment by the card. In the parlor car compartment are writing desks with stationery and the daily newspapers.

At a meeting of railroad traffic officers in Austin, Tex., last week Railroad Commissioner Regan stated that he would favor the establishment of a railroad traffic association in that city to take the place of the Southwestern Bureau, which appears to have been virtually disbanded. The railroad men were asked to submit to the Commission a plan for such an association. Mr. Regan evidently thinks that an association of the kind referred to—which is modeled on the plan of the late Joint Traffic Association—would be a good thing for what it could do to regulate intra-state traffic, but the railroads probably will want an association chiefly for interstate business, and on that the courts would probably declare their association illegal.

The freight rate war between Atlantic Coast cities and Kansas City and other points on the Missouri River continues, but it is said that there is a prospect of a settlement within a few days. The lines carrying freight by water to New Orleans and thence northward by rail (the principal aggressor being the Kansas City, Pittsburgh & Gulf) have made successive reductions to retain what they claim as their reasonable differential of 15 cents below the rates made by lines like the Norfolk & Western, which take freight from New York to southern railroad terminals by water; and the latter lines have of course followed. It is said that the Norfolk & Western has just announced a tariff on the basis of 80 cents per 100 lbs. (first class) from New York to the Missouri River. The direct lines from New York have not yet met any of the reductions.

### Iron Ore Traffic.

Over a hundred thousand tons of iron ore are now afloat for Philadelphia, and while four cargoes are from Cuba, six are from Spain and several are from the Black Sea, and even from India. A large fleet of steamers is constantly leaving Philadelphia in ballast for Cuba and returning with cargoes of iron and manganese ores; but the Cuban mines are, in their present state of development, far from sufficient for the demands of furnaces near enough the coast to run on imported ores, and a great increase in the importation is looked for. Two schooners are now on their way to Philadelphia with ore from Newfoundland, and a German steamer with a capacity of 5,000 tons has just been chartered in Philadelphia to bring ore from that island.—New York Journal of Commerce, July 15.

### New York's Grain Exports.

The Journal of Commerce (New York) publishes statistics, prepared for the State Commerce Commission, now making an investigation of the subject, which show how New York has fared as compared with other Atlantic ports in getting a share of the export grain and flour trade. The Commission, says the Journal, has decided to compare New York, not with all the other ports, but with the five nearest her; the competition of Galveston and New Orleans may be sustained by forces which cannot be met; but Boston, Philadelphia, Baltimore, Norfolk and Newport News are direct competitors, and it is the conditions at these ports that New Yorkers should study. The Journal lays particular stress on a comparison of 1898 with 1873, the percentage of the total exports passing through New York having fallen in these 25 years from 78 to 37; but as a matter of more practical interest we copy the figures for the last four years (1895-98). In flour the percentages of the different ports have not varied very much, and in wheat New York still holds a good share; it is in corn that the other ports have got the better of her. Quantities are not given; in the percentages, 100 equals the total at all the six ports named.

Percentages of Receipts and of Exports of Corn, Wheat and Flour.

	1898.		1897.		1896.		1895.	
	R.	E.	R.	E.	R.	E.	R.	E.
New York	38.9	37.2	36.0	32.4	36.6	33.7	46.4	47.6
Boston	11.0	10.4	10.8	10.0	14.5	12.7	15.5	13.1
Philadelphia	15.5	14.3	13.5	13.7	13.6	9.5	11.7	7.0
Baltimore	23.9	25.6	24.9	28.1	22.1	26.6	17.7	10.8
Newport News	7.8	9.1	8.2	10.2	7.6	10.0	6.5	9.3
Norfolk	2.9	3.4	4.5	5.6	5.6	7.5	2.2	3.2
Wheat only:								
New York	58.0	55.5	57.4	43.8	51.2	46.4	63.5	63.5
Boston	13.1	13.7	14.4	16.8	24.3	24.7	16.2	15.0
Philadelphia	5.9	6.3	8.6	8.4	10.7	12.2	5.0	4.8
Baltimore	19.6	20.6	23.5	25.7	13.8	16.6	10.8	12.4
Corn only:								
New York	26.7	26.1	26.3	32.7	28.9	22.9	43.0	42.4
Boston	8.2	7.6	7.9	6.7	9.7	7.0	15.0	11.5
Philadelphia	19.4	19.7	16.9	18.0	9.9	10.6	8.1	7.1
Baltimore	29.7	29.7	29.6	30.7	27.5	31.6	19.8	20.8
Newport News	10.0	10.6	11.1	12.0	10.3	12.4	8.1	10.5
Norfolk	5.9	6.2	8.2	8.9	12.8	15.4	5.9	7.7

### Regulation of Ticket Brokerage.

The City Council of Omaha has passed an ordinance regulating ticket brokerage, and in a suit in the District (local) Court it has been sustained. The ordinance provides that every person engaging in that business shall give a bond for \$2,000, signed by a reputable guarantee company, and the bond stipulates that every ticket sold is guaranteed, and if not guaranteed the money must be refunded. Further provisions forbid hawking of tickets upon the street; all business must be transacted at a regular place of business. The brokers made a test case with C. Larson. He was arrested, and filed a petition for habeas corpus. The court refused to grant the writ.

The State of Florida now has a ticket brokerage law which is much like the stringent statute which existed in New York two years ago; and it is so severe on the brokers that it is said they were going to attack it in the courts without delay. The temporary injunction which was obtained against the ticket brokers in Detroit on the occasion of the

Christian Endeavor convention has been made permanent, though in doing this the court restricted the application of the order to tickets which require the purchaser to identify himself before using the return portion of an excursion ticket. The scalpers deny that they intended to buy these non-transferable tickets, "but," said the Court, "if such is the case the injunction does them no harm." The judge plainly said, however, that he thought the defendants did intend to buy and sell those tickets. The railroads were ordered to give a bond of \$2,000 to each broker to indemnify him against possible loss in case the railroads' contention should prove erroneous.

### Lake Traffic.

Lake shipping interests are doing more and better business than for several years, and there has been a steady advance in lake freight rates and in wages on lake vessels and docks since the season opened. It is stated that the steel plants are all short of ore, that the Northwest is short of coal and that all lake vessels are now doing a profitable business, even the older and smaller boats being in constant service. The following table gives a comparison of lake freight rates on July 15 for the past three years:

	1899.	1898.	1897.
Iron ore from Lake Superior, cents per ton	100	50	50
Corn from Chicago mills, per bushel	20.0	7.5	12.5
Wheat from Duluth, " "	27.5	10.0	12.5
Coal, Buffalo to Chicago, cents per ton	50	20	20
Coal, Cleveland to Lake Superior	40	20	20

### Decisions on Grain Rates from Sioux City to Chicago.

The Interstate Commerce Commission, in an opinion by Commissioner Prouty, has announced its decision in the case of the Grain Shippers' Association of Northwest Iowa against the Illinois Central and others.

The transportation of grain eastward from Kansas City and from Sioux City and other points in the territory adjacent to Sioux City is subject to competition between the carriers; but while reduced rates have resulted from the competition at Kansas City the competition in northwest Iowa has been more effectively restrained by an agreement formerly in effect, and, since such agreement was canceled, by continuance of rates without substantial reduction. The rate on corn to Chicago from most points in western Iowa is 17 cents per 100 lbs. Examination of the rates and rate changes for a period of years indicates that a rate of 15 cents on corn from Kansas City to Chicago should be applied at all Missouri River points, but the evidence is not sufficient to enable a definite conclusion. It does appear, however, that the rates on grain from Sioux City and other points in a limited section of northwest Iowa are too high.

The Commission decides that the 19-cent rate on corn from Sioux City and other points in adjacent territory should be reduced, the 17-cent rate on corn now in effect from most points in western Iowa should be extended to Sioux City and points in Iowa on and east of the Sioux City & St. Paul (now part of the C., St. P., M. & O.), and corresponding reduction should be made from other points in southeastern South Dakota. The Commission further held that, while no opinion is expressed as to what is the proper relation of the rates on wheat and corn from Sioux City and adjacent territory, the difference of 4 cents which now prevails from most shipping points in that section should not be exceeded.

The complainants also demanded reparation, but this was denied upon the ground that there is no proof that the rates were unreasonable at the time they were paid.

Among the legal points decided in this case is the following: The capitalization of a railroad, to have consideration in cases involving the readjustment of rates, should be accompanied by a history of the capital account, the value of the stock and various securities, and the actual cost and value of the property itself. To make the capital account of railroads the measure of legitimate earnings would place, as a rule, the corporation which has been honestly managed from the outset under enormous disadvantages.

### Chicago Traffic Matters.

Chicago, July 19, 1899.

The conference in St. Louis between the Receivers of the Kansas City, Pittsburgh & Gulf and the executive officers of the Western and Southwestern lines on the New York-Missouri River freight rates amounted to nothing. The representatives of the Gulf line declined to recede from the position that their line ought to be allowed a ten cent differential on this traffic, while the officers of the direct roads maintain that a differential is unreasonable. The officers of the direct lines have not yet given up hope and will meet the receivers of the Gulf line in New York this week to again talk over the subject. The Santa Fe has given notice that it will not handle this New York business via Galveston.

The old practice of giving clergymen west of Chicago half-fare trip tickets on presentation of their annual western permits is likely to be stopped by the Eastern roads. At a recent meeting of the Central Passenger Association the question of discontinuing this practice was referred to a committee to report in August.

The city ticket agents of the stronger roads are up in arms over the street ticket solicitors, or "body snatchers," as they are called. While the street man is not a new feature of the local railroad world, it is only recently that he has become a nuisance. During the last few weeks the "body snatchers" have multiplied to an alarming extent. It is estimated that in the two blocks in Clark street, between Monroe and Jackson, and the block in Adams street, between Clark and Dearborn, there are now between fifty and seventy-five of these fellows. They work every day, except Sunday, and they would not stop for the Seventh Day if the offices were open. Most of them are worn-out railroad men, regularly in the employ of railroads or scalpers. Many of them have no connection with either, but work on their own responsibility, relying on what commissions they can get. Unfortunately a good many of the railroads recognize these outside men. A petition is being prepared to be presented to the city authorities, asking that the men be either driven from the street or be compelled to take out brokers' licenses, which would be equivalent to an abatement of the nuisance, as few of them could get together enough money to pay for a broker's license.

All of the lines except one, leading into New England, have withdrawn the low tourist rates put in from Chicago a few weeks ago. The Grand Trunk still uses its \$38 rate and refuses to take it out.